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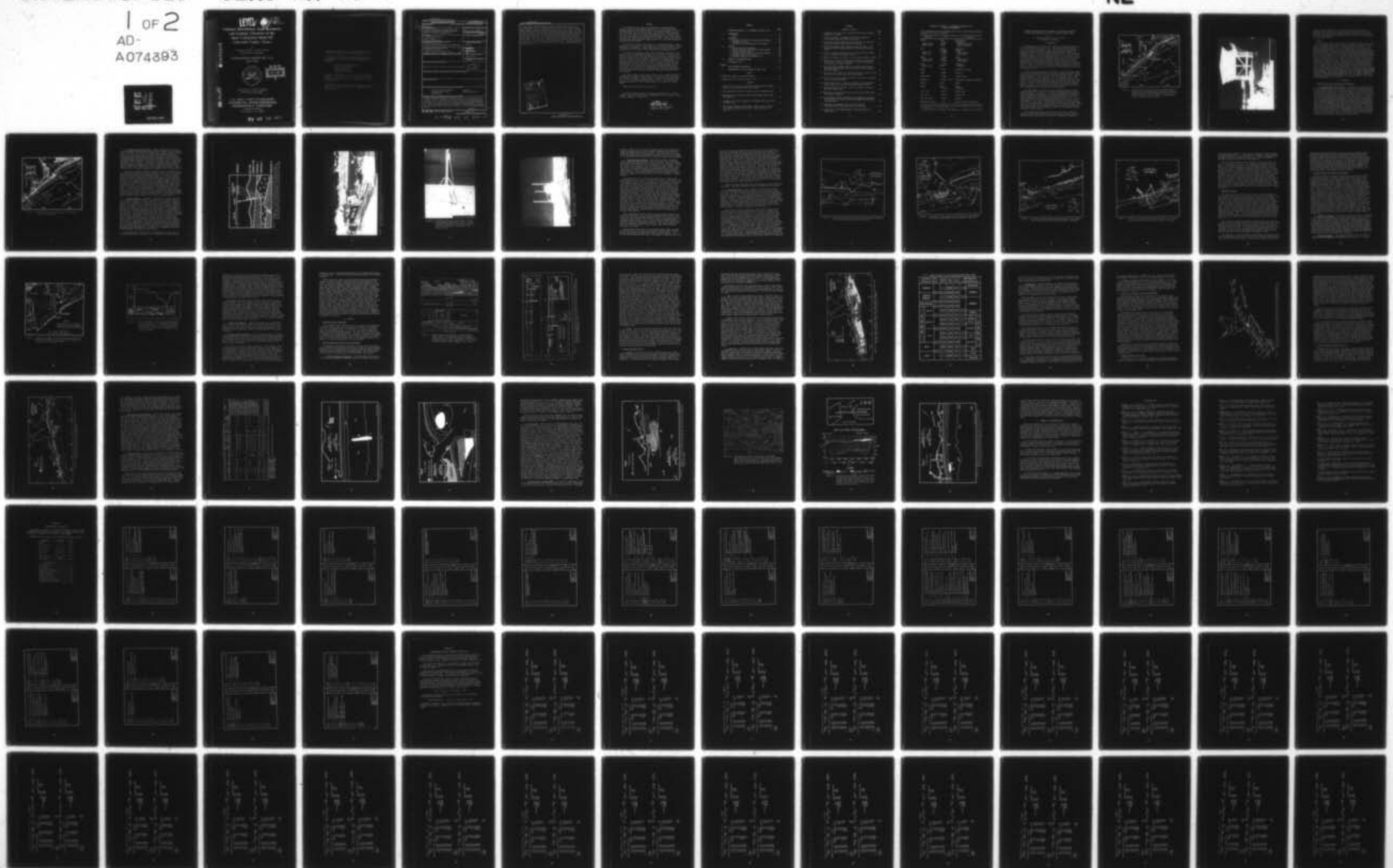

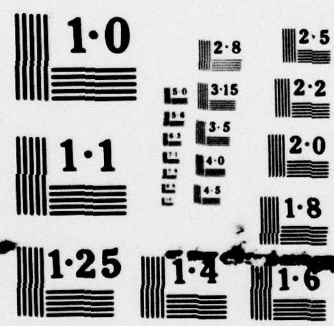
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MR 79-4

Sediment Distribution, Sand Resources, and Geologic Character of the Inner Continental Shelf Off Galveston County, Texas

by

S. Jeffress Williams, Dennis A. Prins,

and Edward P. Meisburger

MISCELLANEOUS REPORT NO. 79-4

JULY 1979

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About 850 square kilometers (330 square miles) of the Texas inner shelf from High Island to Freeport was surveyed and studied, using high-resolution continuous seismic reflection profiles taken along several hundred kilometers of trackline and 34 long cores, to determine the general geologic character and surface and subbottom sediment distribution. The objective was to assess the resource potential of sand deposits suitable as fill for beach nourishment projects.

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Pleistocene and older sedimentary deposits underlie the study area at shallow depths, and several prominent erosion surfaces and deeply incised, and subsequently filled, stream channels are evident on the seismic records. The thickness of Holocene sediments is generally less than 3 meters (10 feet), except in channels, and the contact between the Holocene and Pleistocene units is obvious in most cores and shows good correlation with a regional reflector on the seismic profiles. Mud and muddy fine sands predominate in the area; however, very fine to fine sand is present on the shoreface and in several delta shoals. Five sites are identified which contain sand suitable for beach nourishment; two of the sites, a shoal adjacent to Galveston south jetty and an area off San Luis Pass, offer the highest potential. Volumetric estimates indicate that 63 million cubic meters (82 million cubic yards) of sand exists in the five sites.

PREFACE

This report provides data and information on the geomorphology, geologic character, and sediment distribution on a part of the Inner Continental Shelf of the Gulf of Mexico, with specific emphasis on locating, describing, and delineating marine sand deposits having potential for use as fill material for beach nourishment projects. Seismic reflection data and sediment cores comprise the data base for the study which is part of the Galveston County Shore Erosion Study. The work was carried out under the coastal processes program of the U.S. Army Coastal Engineering Research Center (CERC).

The report was prepared principally by S. Jeffress Williams, a CERC geologist, with assistance in all phases of the study from Dennis A. Prins and Edward P. Meisburger. General supervision and review of this report was provided by C.H. Everts, Chief, Geotechnical Engineering Branch.

The authors acknowledge S. Tanner and C. McClenan, principal investigators at the U.S. Army Engineer District, Galveston; M. Kieslich, the former project engineer; G.R. Powledge and E.W. Schuldt, Foundations and Materials Branch; and R. McCullough, captain of the survey vessel *Vollert*. The U.S. Geological Survey (USGS), Corpus Christi, provided copies of existing seismic profiles as well as logistical help and facilities for sampling the cores; H.L. Berryhill and G.L. Shideler of USGS were especially helpful in providing their time and geologic knowledge of the Texas shelf. The authors also acknowledge J.H. McGowen and R. Morton, University of Texas, Bureau of Economic Geology, for their permission to use unpublished data on surficial sediment distributions derived from their studies.

The original copies of the seismic data, as well as sample splits of representative sediment from the cores, are stored at CERC. The cores are stored at the USGS in Corpus Christi. Request for information relative to all of the above should be directed to S.J. Williams, Coastal Engineering Research Center, Kingman Building, Fort Belvoir, Virginia 22060.

Comments on this publication are invited.

Approved for publication in accordance with Public Law 166, 79th Congress, approved 31 July 1945, as supplemented by Public Law 172, 88th Congress, approved 7 November 1963.

Ted E. Bishop

TED E. BISHOP
Colonel, Corps of Engineers
Commander and Director

CONTENTS

TABLES

FIGURES

CONTENTS

FIGURES--Continued

CONVERSION FACTORS, U.S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U.S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

Multiply	by	To obtain
inches	25.4	millimeters
	2.54	centimeters
square inches	6.452	square centimeters
cubic inches	16.39	cubic centimeters
feet	30.48	centimeters
	0.3048	meters
square feet	0.0929	square meters
cubic feet	0.0283	cubic meters
yards	0.9144	meters
square yards	0.836	square meters
cubic yards	0.7646	cubic meters
miles	1.6093	kilometers
square miles	259.0	hectares
knots	1.852	kilometers per hour
acres	0.4047	hectares
foot-pounds	1.3558	newton meters
millibars	1.0197×10^{-3}	kilograms per square centimeter
ounces	28.35	grams
pounds	453.6	grams
	0.4536	kilograms
ton, long	1.0160	metric tons
ton, short	0.9072	metric tons
degrees (angle)	0.01745	radians
Fahrenheit degrees	5/9	Celsius degrees or Kelvins[1]

[1]To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use formula: C = (5/9) (F -32).

To obtain Kelvin (K) readings, use formula: K = (5/9) (F -32) + 273.15.

SEDIMENT DISTRIBUTION, SAND RESOURCES, AND GEOLOGIC CHARACTER OF THE INNER CONTINENTAL SHELF OFF GALVESTON COUNTY, TEXAS

by
S. Jeffress Williams, Dennis A. Prins,
and Edward P. Meisburger

I. INTRODUCTION

The Galveston region of the Texas coast is an important resort area that is threatened by severe erosion. The National Shoreline Study (U.S. Army, Corps of Engineers, 1971), which included an assessment of beaches in the Galveston area, reported severe erosion along a 6.4-kilometer (4 miles) section of beach immediately west of the end of the Galveston seawall, as well as along a 20.8-kilometer (13 miles) stretch on Bolivar Peninsula west of High Island (Fig. 1). More recent surveys (U.S. Army Engineer District, Galveston, 1976) show that the threat of severe erosion is great along most of the upper Texas coast, and in particular the western end of Galveston Island at San Luis Pass and at Surfside Beach, a 3.2-kilometer (2 miles) stretch of beach near Freeport (Fig. 1). Beach recession at Surfside averaged 2.4 meters (8 feet) per year from 1968 to 1975, and several houses were undermined and destroyed by the waves (Fig. 2).

In 1976, the Galveston District initiated a study to evaluate causes of erosion and possible control measures for eroding gulf and bay shorelines in Galveston County, as well as the Surfside Beach area in adjacent Brazoria County (U.S. Army Engineer District, Galveston, 1976). The overall objectives of the study were to: (a) determine the needs and concerns of local people relating to shoreline erosion within the study area, (b) identify eroding shoreline areas and determine the cause and rates of erosion, (c) delineate those shoreline areas where potential Federal interest exists and develop and evaluate alternatives, and (d) make recommendations for solving the erosion problems.

Beach nourishment has proven to be one solution for many severely eroded coastal areas because it is usually environmentally and esthetically acceptable. In addition, it is often an important and effective means of counteracting coastal erosion, of providing relief from hurricane flooding, and of enhancing recreational facilities (U.S. Army, Corps of Engineers, Coastal Engineering Research Center, 1977). However, nourishment of a beach does require large volumes of suitable sand as fill, and in recent years it has often been impractical to obtain needed material from back-barrier island lagoons and bays or from inland sources because of economic or environmental factors, or land-use restrictions. Also, material from bays and lagoons is often too fine grained to meet beach-fill design criteria.

The Coastal Engineering Research Center (CERC) has a continuing research program with the objective to locate and accurately describe offshore marine sand resources suitable for dredging and transport to

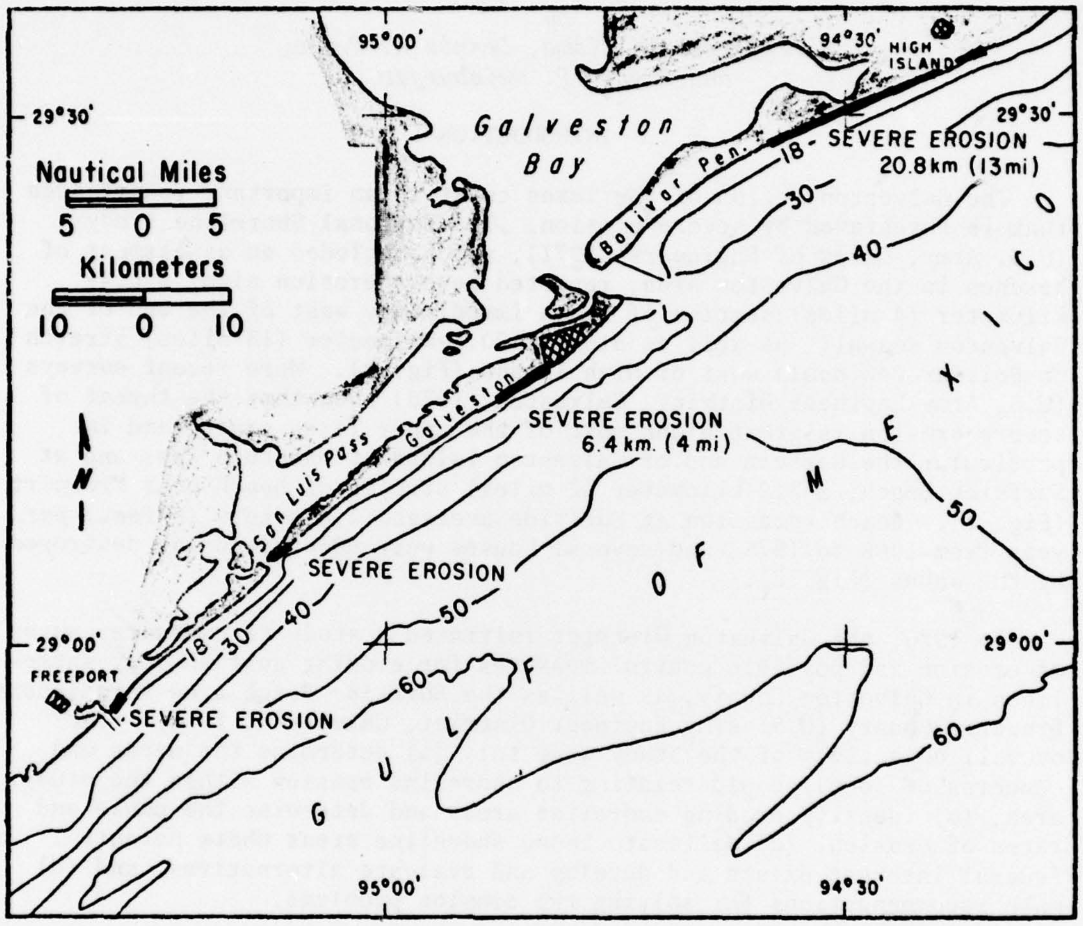


Figure 1. Sections of the Texas gulf coast from High Island to Freeport which are experiencing severe beach erosion as identified by the National Shoreline Study (U.S. Army, Corps of Engineers, 1971) and the U.S. Army Engineer District, Galveston (1976) surveys.

(Photo by S.J. Williams)

Figure 2. Photo showing the effects of beach erosion at Surfside Beach, June 1977.

adjacent project shorelines. This study was conducted to provide a detailed survey (using seismic reflection data and long cores) of the shelf off Galveston County and Surfside Beach to determine the location, character, and volume of sand having potential value as fill for nourishment of eroding beaches.

Scope.

The study area (Fig. 3) covers about 850 square kilometers (330 square miles) of the Gulf of Mexico from High Island (94°20'W., 29°30'N.) west about 85 kilometers (55 miles) to Freeport (95°20'W., 28°55'N.), and centered about Galveston, Texas. It includes parts of the Texas Inner Continental Shelf off Bolivar Peninsula, Galveston Island, Follets Island, and Surfside Beach. The area of data collection extends seaward a maximum of about 8 kilometers (5 miles) from the shoreface (water depths from about 3 to 15.5 meters or 10 to 50 feet). Data collected consist of about 435 kilometers (270 miles) of seismic reflection profiles and 34 cores ranging in length from 2.2 to 6.1 meters (7.3 to 20 feet). The mean core length is 4.9 meters (16 feet). These data were supplemented by logs of engineering borings taken along the Freeport and Galveston jetties and across San Luis Inlet. Additional information on the subbottom geology was also derived from several hundred trackline kilometers of seismic records taken along shore-normal transects as part of a joint U.S. Geological Survey (USGS) and the University of Texas, Bureau of Economic Geology (TBEG) program. Also, a TBEG map showing surficial sediment distributions based on several hundred grab samples was used. Pertinent scientific and technical literature and hydrographic maps were also used. Especially informative were the TBEG environmental atlases by Fisher, et al. (1972, 1973) and McGowen, et al. (1976).

II. BACKGROUND

1. Equipment and Field and Laboratory Procedures.

a. Geographic Positioning System. An electronic positioning system, the Motorola Mini-Ranger III, was used to accurately determine position of the research survey vessels during both phase I of seismic surveying and phase II of taking cores. The system determines the position of the survey vessel with respect to two known reference points on shore and is restricted to line-of-sight operation. The stated accuracy is ±3 meters. The basic system consists of a master mobile unit mounted on board the vessel and two shore-based transponders. The master unit interrogates each transponder separately and the elapsed time between the transmitted pulse and the transponder reply pulse is converted to a measurement of distance. Each distance (range) from the two transponders at the known shore stations is displayed, in turn, on the range console. This range information, together with the known locations of the shore stations, is then trilaterated and plotted on hydrographic charts to obtain the position (fix) of the survey vessel. Navigational fixes during the seismic survey were obtained about every 2 to 4 minutes and each fix was keyed to the seismic records by an event mark on the records.

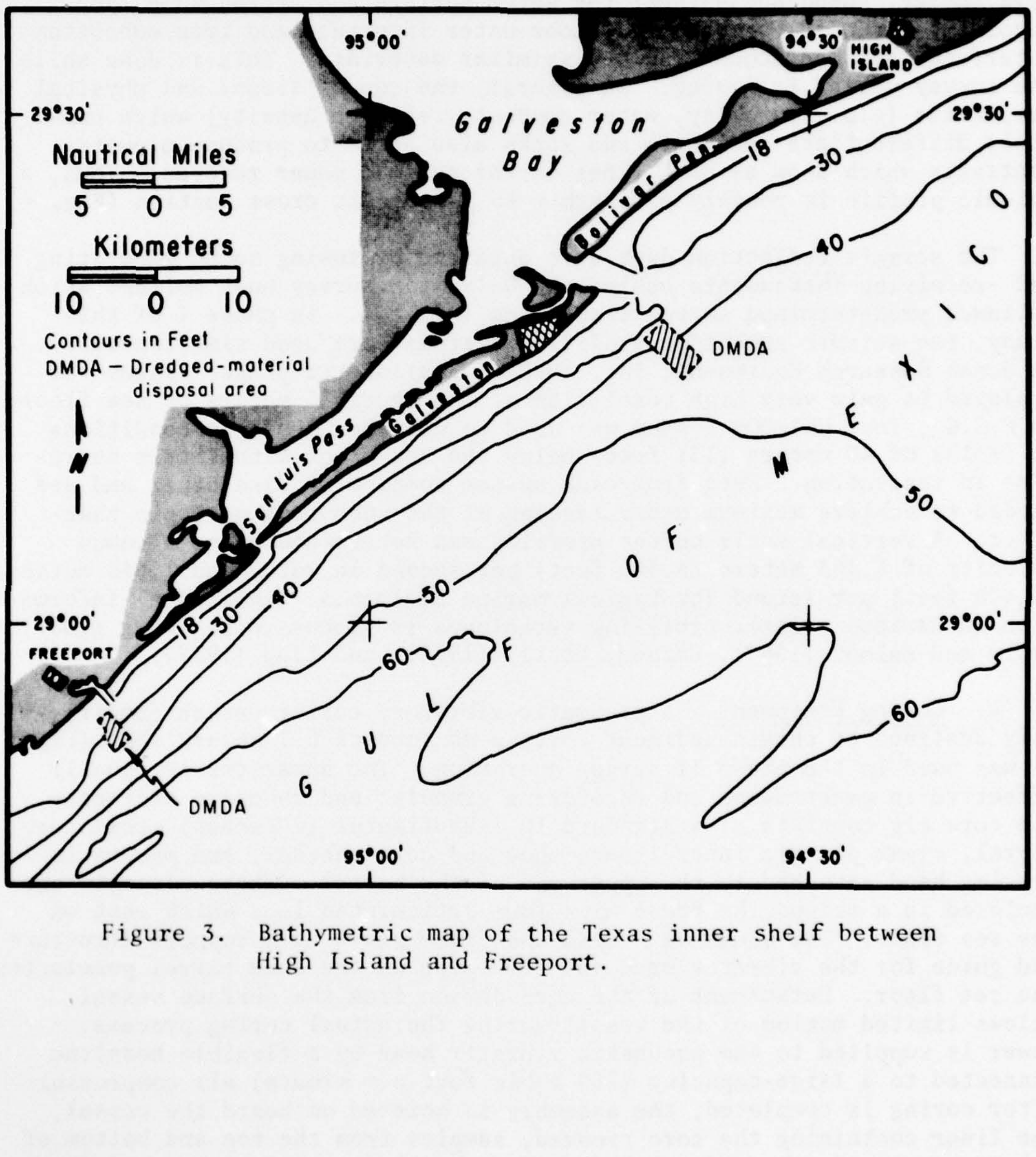


Figure 3. Bathymetric map of the Texas inner shelf between High Island and Freeport.

b. Seismic Reflection Profiling. Seismic reflection profiling is a technique widely used for delineating geologic features such as bedding surfaces, faults, rock outcrops, channels, and structures beneath the sea floor. Continuous reflections are obtained by generating repetitive, high-energy, sound pulses near the water surface and at the same time recording "echoes" from the sea floor-water interface and from subbottom interfaces between acoustically dissimilar materials. This is done while the survey vessel is moving. In general, the compositional and physical properties (e.g., porosity, water content, relative density) which commonly differentiate sediments and rocks also serve to produce acoustic contrasts which show as dark lines on the seismic paper records. Thus, a seismic profile is roughly comparable to a geologic cross section (Fig. 4).

The seismic reflection data were obtained by towing sound-generating and -receiving instruments behind the Galveston survey boat *Vollert* which followed predetermined survey tracklines (Fig. 5). In phase I of this study, two seismic subbottom profiling systems were used simultaneously. An Ocean Research Equipment, Inc. (ORE) 3.5-kilohertz pinger system was employed to gain very high resolution of the upper 15 meters of sea floor; an E.G.G., Inc. UNIBOOM system was used to decipher geologic conditions to depths of 40 meters (131 feet) below the sea floor with little sacrifice in resolution. Data from each system complement each other and are needed to achieve maximum understanding of the subbottom geologic character. A vertical scale on the profiles was determined using a sound velocity of 1,463 meters (4,800 feet) per second in water and 1,645 meters (5,400 feet) per second for typical marine sediments. Additional information on various seismic profiling techniques is discussed in Ewing (1963), Moore and Palmer (1967), Barnes, et al. (1972), and Ling (1972).

c. Coring Equipment. A pneumatic vibratory coring device specifically designed to obtain sediment cores a maximum of 6.1 meters long (Fig. 6) was used in the phase II survey operation. The apparatus is equally effective in penetrating and recovering granular and cohesive sediments. The core rig consists of a standard 10.1-centimeter (4 inches) steel core barrel, clear plastic inner liner, shoe and core catcher, and pneumatic driving head attached to the upper end of the barrel. These elements are enclosed in a tripodlike frame with four articulated legs which rest on the sea floor. The aluminum H-beam and frame serve as a support structure and guide for the vibrator head and core pipe as the core barrel penetrates the sea floor. Detachment of the core device from the surface vessel allows limited motion of the vessel during the actual coring process. Power is supplied to the pneumatic vibrator head by a flexible hoseline connected to a large-capacity (250 cubic feet per minute) air compressor. After coring is completed, the assembly is hoisted on board the vessel, the liner containing the core removed, samples from the top and bottom of the core removed, the ends sealed, and the core is carefully marked for orientation and identification. The historical development of vibratory coring equipment is discussed by Tirey (1972).

The self-propelled jack-up barge, *Lim Bowman* (Fig. 7), was used as the platform for phase II coring. It is 18.3 meters (60 feet) long and

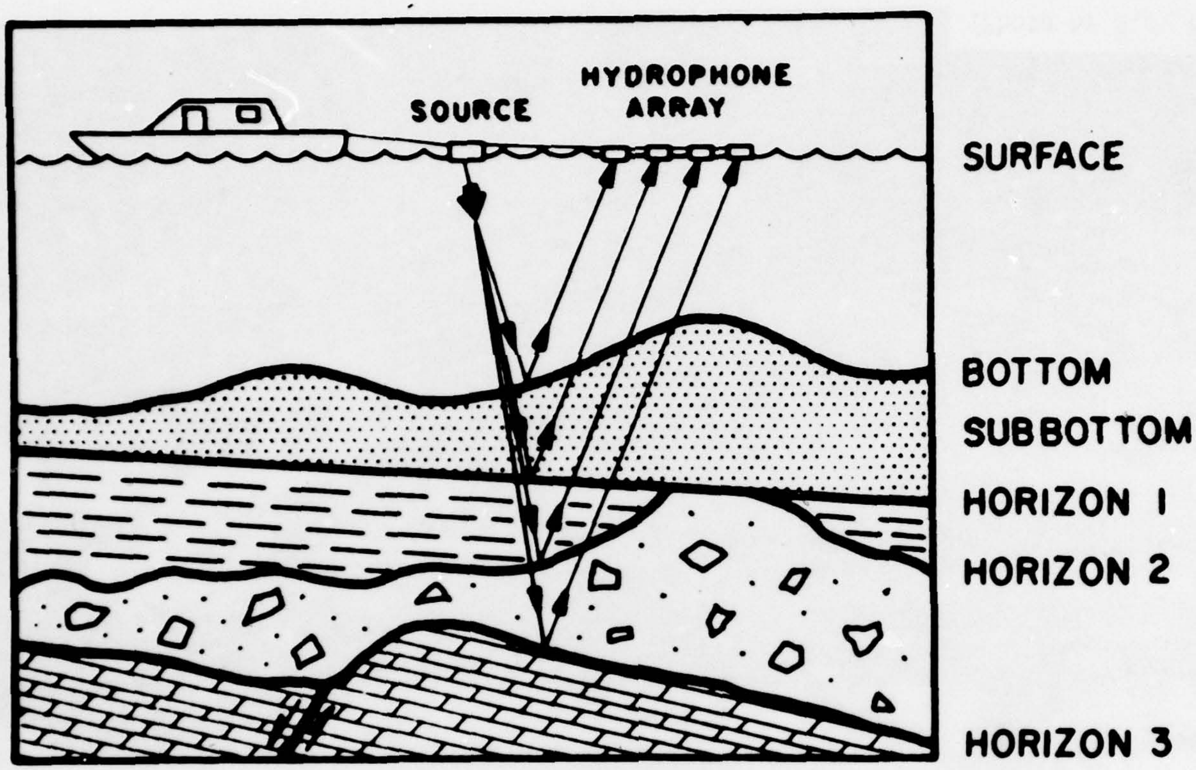
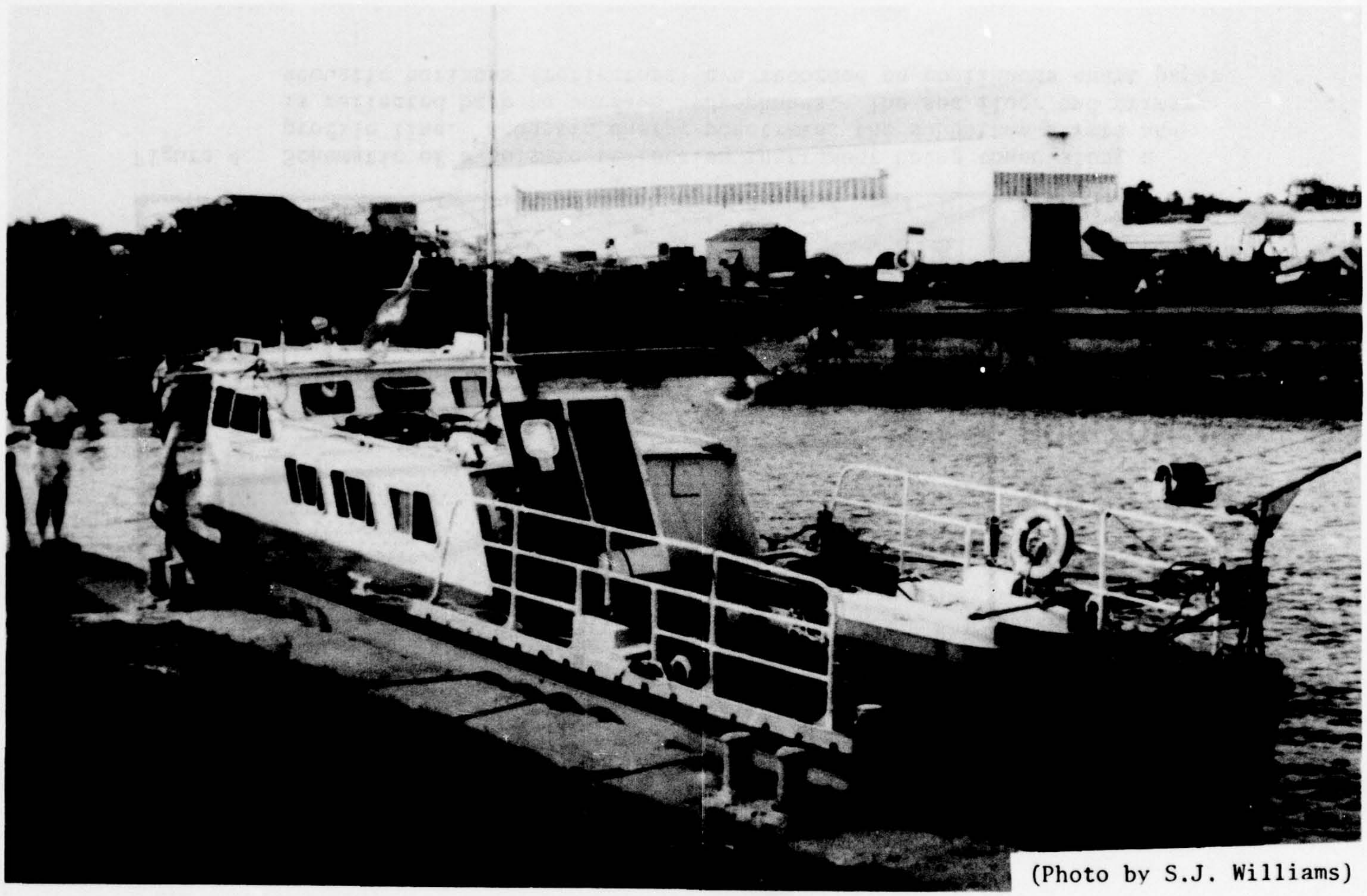
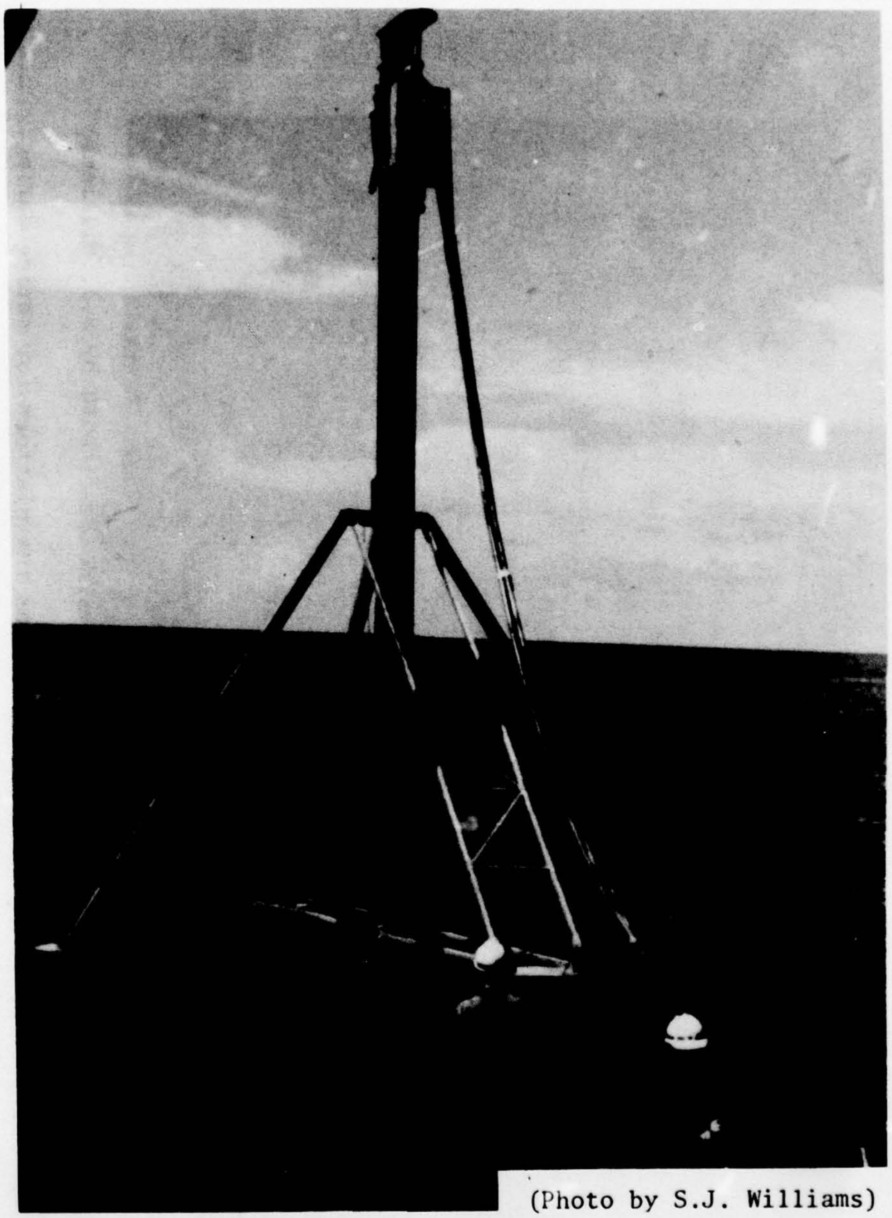


Figure 4. Schematic of a seismic reflection instrument being towed along a profile line. Acoustic energy penetrates the subbottom strata and is reflected back to surface hydrophones. The sea floor and primary acoustic horizons (reflectors) are recorded on continuous chart paper.



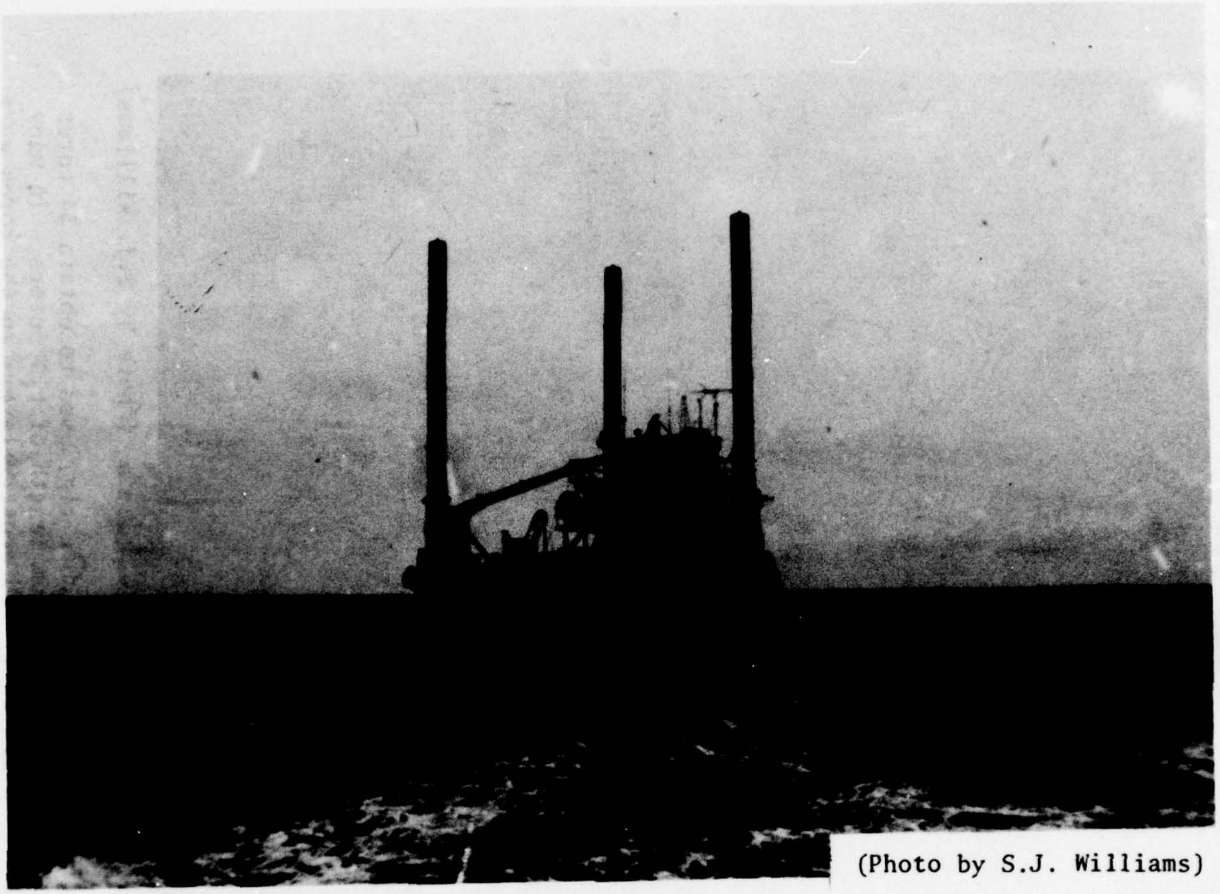
(Photo by S.J. Williams)

Figure 5. The Galveston District survey boat, *Vollert*, used to collect the seismic reflection data and to locate core sites for phase II.



(Photo by S.J. Williams)

Figure 6. A vibratory core rig, used to obtain 34 cores with a maximum length of 6.1 meters. In many instances sedimentary layers in the cores were correlated with acoustic reflectors on the seismic profiles.



(Photo by S.J. Williams)

Figure 7. The jack-up barge *Lim Bowman*, used as the platform for coring during phase II of data collection.

requires a boat crew of two and a four-man coring crew to navigate the vessel and operate the 5-ton crane used to lower and raise the core apparatus between the deck and sea floor. The three legs on the barge, which are hydraulically operated from the pilot house, enable the barge to be raised above the sea and swell to provide a stable coring platform.

d. Data Collection Planning. Before the field data collection effort, tentative offshore seismic survey tracklines were established and plotted on navigation charts of the survey area. Position, spacing, and length of the tracklines were determined by several factors. A primary concern was spacing the lines to achieve maximum coverage of the study area. The inshore boundary was approximately the 5-meter depth contour which is about the minimum depth for obtaining good quality seismic profiles; the seaward boundary was about 8 kilometers offshore which was judged to be the economic limit for sand transport to project beaches.

A second factor was to lay out the seismic lines so that buried stream channels, relict barrier islands, tidal shoals, river deltas, and other geologic features with a high potential for containing sand would be crossed and show on the seismic profiles. Preliminary core sites were selected on the basis of bathymetric information; however, final core sites were chosen after all the seismic data were collected and subjected to preliminary interpretation. After the survey tracklines were selected, the locations of the shore stations for the navigation system were determined. Of high priority were stations at elevated positions (for adequate line-of-sight) which also offered good triangular position in relation to the survey ship and adjacent shore stations. (Optimum geometry is achieved when the angle of range intercept of the vessel is greater than 30° and less than 150°; optimum range angle intercept is 90°.) After shore stations were determined and plotted on map sheets, their positions were accurately surveyed. A total of eight shore navigation stations were used along 85 kilometers of coast. Occasionally, positions and spacing of the predetermined tracklines were altered to gather additional information on geologic features such as buried stream channels, sediment contacts, and sea floor outcrops of possible sandy material.

After approximately 435 kilometers of seismic profile records was collected, preliminary analysis and interpretations were made to select coring sites with the greatest potential, based on past experience, for retrieving sandy material. Use of seismic data to decipher geologic conditions before selecting final core sites enables their selection to be based on the best information available. Thus, this procedure maximizes the usefulness of both sources of data and provides the most efficient use of funds.

During phase II the *Vollert*, with the positioning system on board, was used to relocate fix positions selected as coring sites. This was done by duplicating the range values from the shore stations. The *Vollert* first maneuvered until one of the ranges was duplicated and then

an arc was run on that range until the other range was intersected, at which time an anchored float was used to mark the core location. The jack-up barge was then positioned adjacent to the float for coring. Core sites were located and marked in this matter because of the limited maneuverability of the barge. Without the *Vollert* much additional time would have been required to get the barge to the precisely determined core locations. The *Vollert* located a core position in minutes and dropped a float marker; the barge then immediately moved in on the marker, jacked-up within a few minutes, and the core rig was lifted from the deck and set on the sea floor next to the float. Meanwhile, the *Vollert* retrieved the float and proceeded to the next core site. Once on the bottom the coring device was energized, the core barrel was driven into the sea floor, and within about 15 minutes the apparatus was lifted back onto the barge. The core liner containing the sediment was removed from the barrel and small reference samples were obtained from the top and the bottom of each core. The liner was then capped and sealed, labeled, and visually inspected. The jack-up barge was lowered and moved to the next coring location. While underway, the coring device was reassembled and loaded with a new liner for the next core.

At the end of each working day the jack-up barge was raised above the sea surface. The barge remained at sea for the duration of the survey.

e. Processing of Data. After completion of both phases of data collection, all the navigational fix marks, ship trackline positions, core sites, and shore stations were plotted to show the coverage within the survey area (Fig. 8). The seismic records were visually examined and marked to establish the primary geologic features such as regional sedimentary reflectors, erosional unconformities, faults, and buried stream channels. Selected acoustic reflectors were then mapped to provide areal continuity of horizons considered significant because of their extent and relationship to the general structure and geology of the study area. Where possible, the topmost reflectors were correlated with cored sediment to provide a measure of continuity between cores.

The cores were visually inspected and described in general terms aboard the barge; a more detailed study of the cores was made later. All cores were split longitudinally to show changes in sediment composition, texture, and physical character. Selected intervals of cores were color-photographed to provide an archive record of the sediment character and color before oxidation and drying from exposure to air. The sediments were identified, logged, and described according to textural properties, gross lithology, color, strength, thickness, presence of marine organisms, and depth from the sea floor (top of the core) (see App. A). Representative sediment samples from each core were examined with a plane light binocular microscope. Samples of sandy material potentially usable for beach fill were prepared; a total of 84 individual samples were processed and the test of every fifth sample was duplicated as a quality control check. Granulometric parameters (e.g., mean grain size, sorting, cumulative-size distribution) were evaluated by using the CERC Rapid Sediment Analyzer (RSA) as described on page 4-26 of the Shore

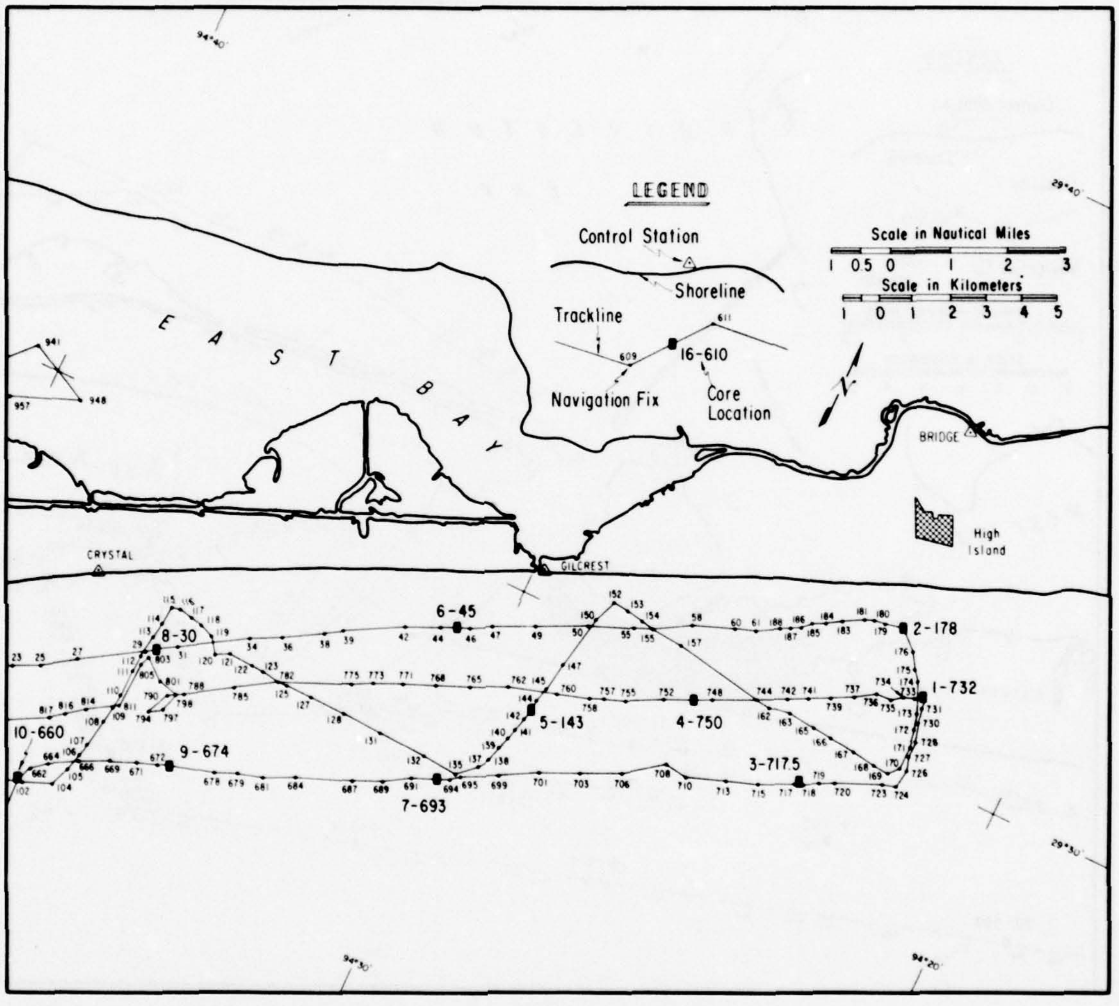


Figure 8. Location of seismic reflection ship tracklines and vibratory cores taken between High Island and Freeport.

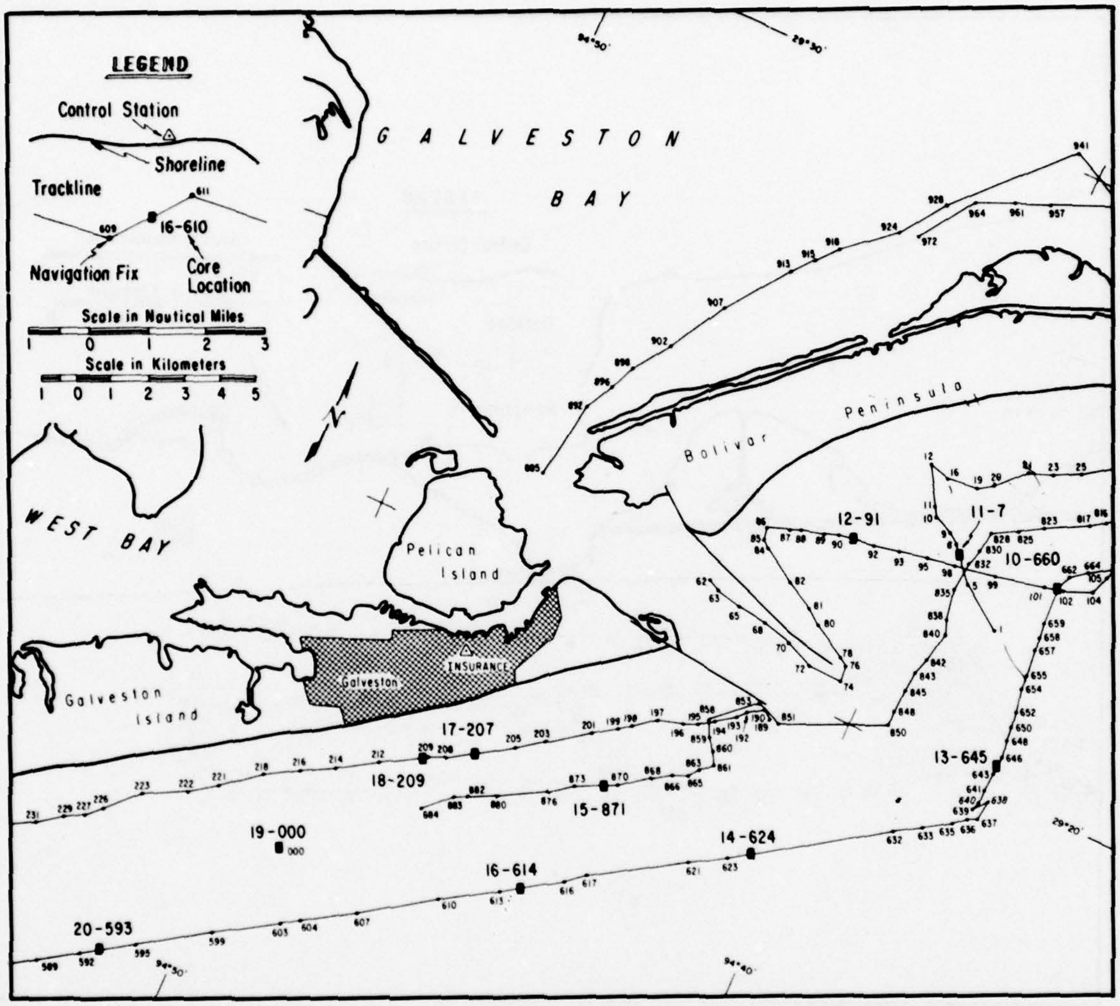


Figure 8. Location of seismic reflection ship tracklines and vibratory cores taken between High Island and Freeport.--Continued

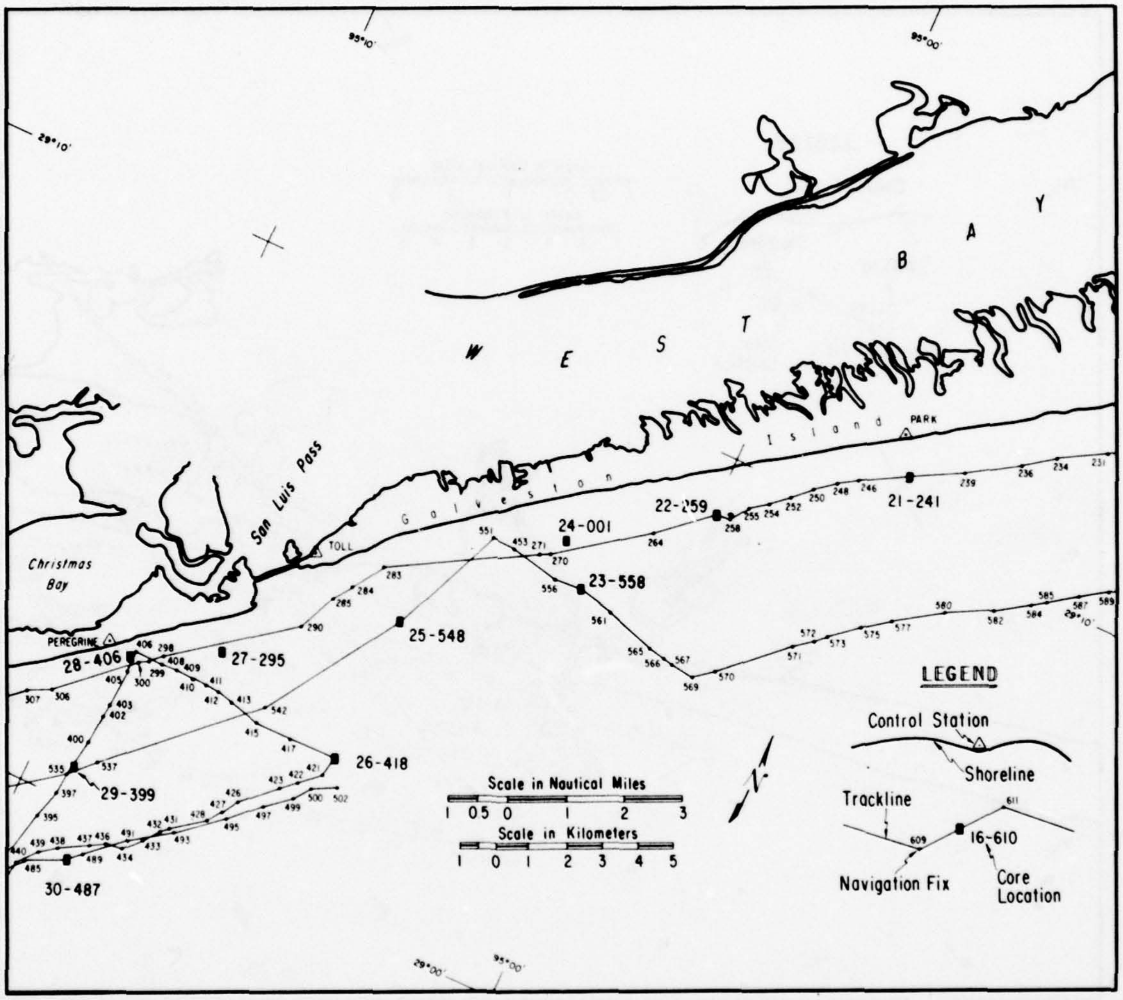


Figure 8. Location of seismic reflection ship tracklines and vibratory cores taken between High Island and Freeport.--Continued

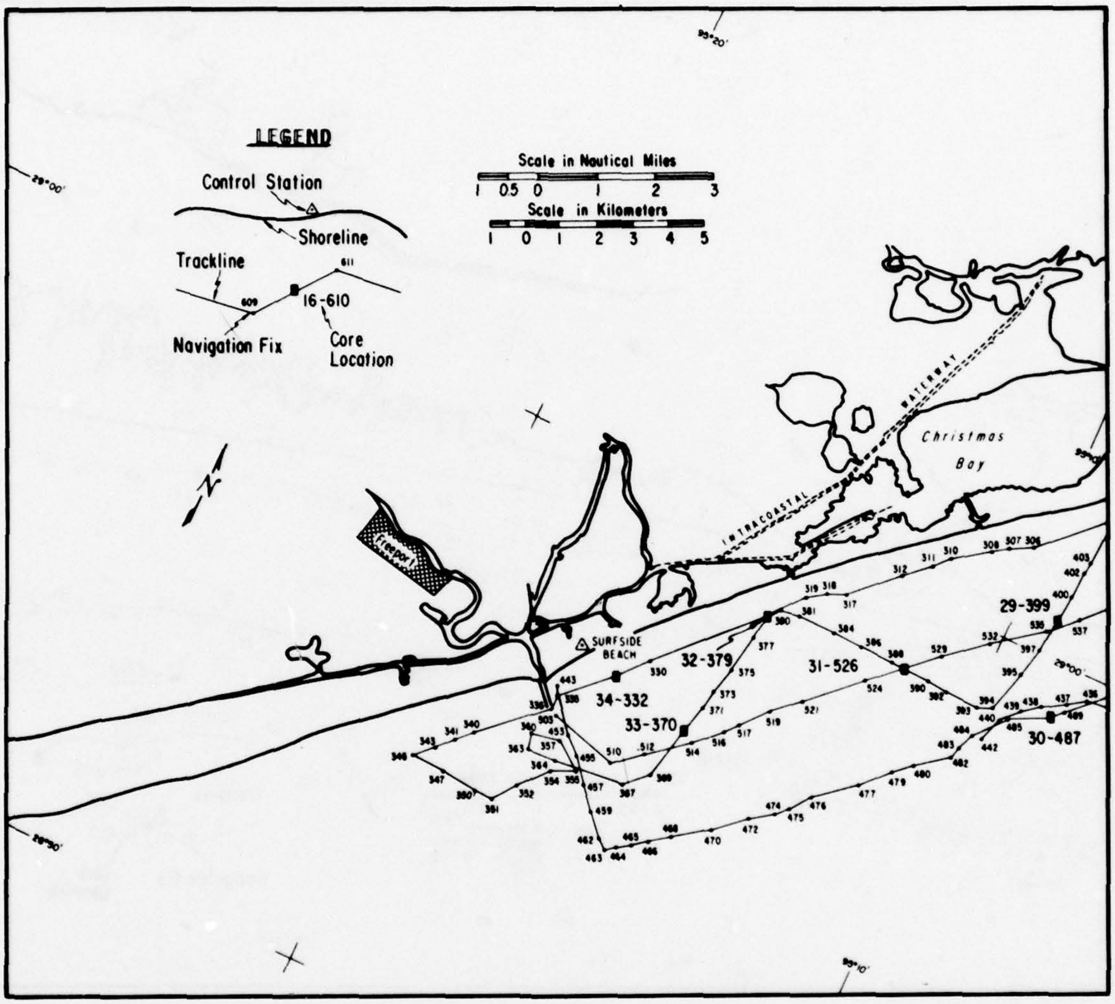


Figure 8. Location of seismic reflection ship tracklines and vibratory cores taken between High Island and Freeport.--Continued

Protection Manual (SPM) (U.S. Army, Corps of Engineers, Coastal Engineering Research Center, 1977). These RSA data, as well as sieve data from one sample too coarse to process by RSA, are presented in Appendix B. Cumulative distribution curves are also presented.

All of the sand sample sizes are described in both millimeters and phi (ϕ) units where $\phi = -\log_2 D$. D is the grain-size diameter in millimeters. In the RSA analysis the sand sample falls through a tube of water and a pressure transducer is used to determine the fall velocity of the sand grains. The SEDANL computer program is then used to compute moments to convert fall velocity to hydraulic grain-size diameter. The RSA method is fast and reliable, but it is limited to analyzing very fine to medium sands. Any fine-grained material present with the sand often remains in suspension in the tube when the measurements are stopped. Thus, the silt and clay fraction in a muddy sand sample is often omitted from the size analysis results, making the sample appear better sorted than it actually is. Most researchers agree that RSA values are consistent and slightly coarser than sieve values for identical samples. Ramsey and Galvin (1977) suggest adding 0.33 phi to the RSA mean to obtain the equivalent sieve mean; another formula, with a similar constant, is shown in Appendix B.

2. Geographic Setting.

The study area is part of the Texas coast of the Gulf of Mexico, a large geosynclinal basin of active deposition that receives sediment from nine major rivers draining from most of Texas and part of New Mexico. The entire Texas coast from the Sabine River at the Louisiana border, south to the Rio Grande River marking the border with Mexico, is composed of long and narrow sandy barrier islands broken by tidal inlets which lead to lagoons and estuaries between the barrier islands and the mainland. The islands are generally of low relief, except for vegetated sand dunes, and most remain in their natural state, relatively undisturbed by human activity. All the barrier island peninsulas are attached to mainland areas on their northeastern ends with the unattached ends extending southwest (Bullard, 1942). Also, the northeast ends of the islands exhibit maximum width and the islands taper toward the southwest. In the study area, these conditions are best exemplified by Bolivar Peninsula (Fig. 3).

The back-barrier lagoons and barrier islands of the Texas coast are geologically very recent features which have formed during the past 5,000 years in response to complex coastal processes as well as the gradual worldwide rise in sea level. The barrier islands in the study area, and for much of the Texas coast, are constructional landforms built up over thousands of years by sand transported to the coast by rivers and then westward along the coast by wave-generated longshore currents.

Galveston Bay is a shallow estuary extending about 32 kilometers (20 miles) inland from the gulf and consists of East Bay behind Bolivar Peninsula and Trinity Bay to the north. Galveston Bay occupies the ancestral

flood plains and drowned channels of the San Jacinto and Trinity Rivers which were inundated as sea level rose during the past 20,000 years. Galveston Island extends about 48 kilometers (30 miles) from the inlet at Bolivar Roads to San Luis Pass. West of San Luis Pass, Follets Island continues for 20 kilometers (12 miles) to the Brazos River Inlet channel and includes the Surfside Beach community near Freeport. About 48 kilometers of coast in the Surfside-Freeport area and west to Matagorda Bay is a headland region which protrudes into the gulf and represents an ancestral delta complex formed by the Brazos and Colorado Rivers. This is one of the few areas along the entire 592 kilometers (370 miles) of Texas coast which is not fronted by barrier islands.

3. Geologic Setting and Regional Stratigraphy.

Galveston County lies within the Coastal Plain Province of the Gulf of Mexico geosyncline. Of greatest importance to this study are the Pleistocene- and Holocene-age sedimentary deposits which make up the youngest of the Coastal Plain deposits (Fig. 9). These materials are composed primarily of alluvial, deltaic, estuarine, and marine deposits. Lankford and Rehkemper (1969) suggest that two of the primary factors controlling the distribution, geometry, and composition of these deposits are (a) tectonic uplift of inland areas and subsidence of offshore gulf areas, separated by a hinge line; and (b) fluctuating elevations of sea level during the past million years or more in response to periods of worldwide glaciation and deglaciation. These sea level fluctuations had a major influence on forming the geologic character and present physiography of the Texas mainland coast and inner gulf shelf. Periods of depressed sea level initiated episodes of mass erosion on land as rivers eroded deep into the valleys and tended to meander more across broad flood plains. In contrast, as sea level rose base levels of the streams were also raised and deposition of sediment predominated. Evidence of different episodes of geologic conditions are sometimes obvious on land in the form of deeply buried ancestral stream channels, broad thick fluvial flood plain deposits, extensive deltaic deposits associated with many of the major streams, and relict barrier spits, islands, dunes, and strand plains resulting from past sea level elevations higher than the present one.

a. Montgomery Formation. The earliest formation of direct importance to this study is the Montgomery Formation (Upper Lissie) (Fig. 10) which is the name for materials deposited during the Sangamon interglacial period directly preceding Wisconsin Glaciation. The Montgomery Formation is composed of various sedimentary facies that reflect fluvial, deltaic, lagoonal and open marine environments of deposition and range in composition from gravels and sands to sandy clays and clays (Anderson and Clark, 1977). During Wisconsin-age (the last glacial episode) the Montgomery Formation was subaerially exposed and subjected to erosion and weathering processes which altered some original sediments to ferruginous sands and stiff oxidized clays with ferruginous concretions.

b. Beaumont Formation. The Beaumont Formation (Fig. 10), which is younger than the Montgomery and unconformably overlies it, is the most

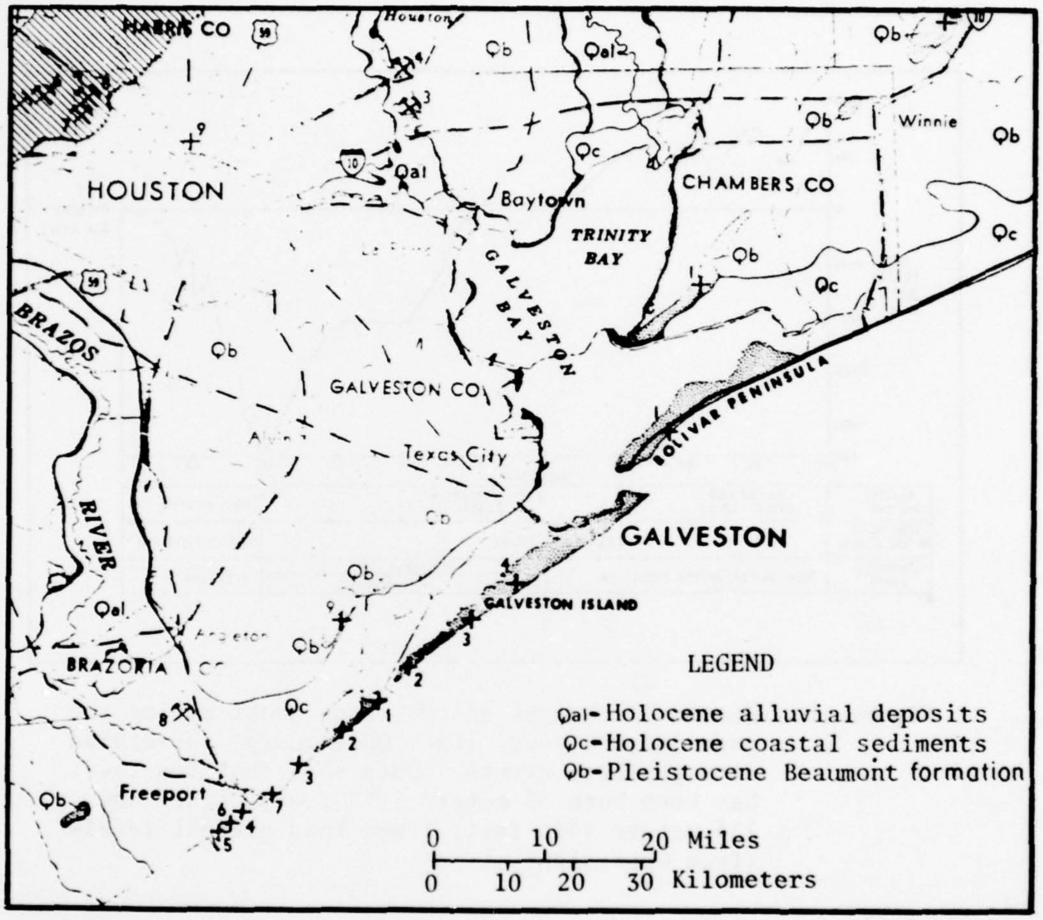


Figure 9. Generalized geologic map of Quaternary-age sediments in the Galveston-Brazoria County region of the Texas gulf Coastal Plain (from Garner, 1967).

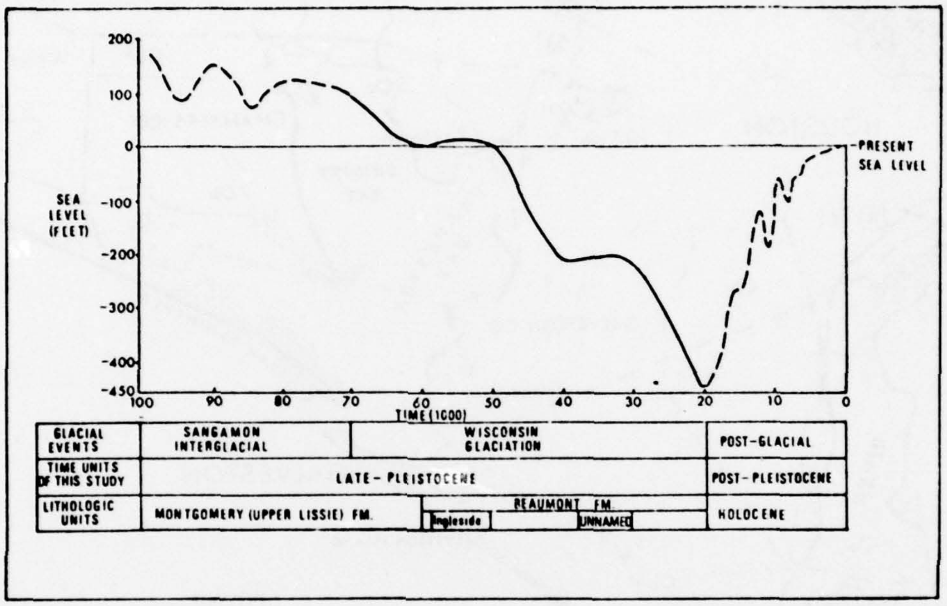


Figure 10. Sea level changes on the Texas coast during the past 100,000 years (Late Quaternary) correlated with geologic events. Data show that sea level has been both 53 meters (175 feet) higher and 134 meters (440 feet) lower than present levels (from Graf, 1966).

widespread and prevalent in both subaerial and submarine exposure in the study area and therefore the most germane to this report. It was deposited during the Wisconsin Glaciation when sea level fluctuated in elevation. Barton (1930) and Pettit and Winslow (1957) describe the Beaumont as consisting of abruptly changing facies of fluvial and deltaic sediments mixed with lagoonal shallow marine deposits and sandy barrier island deposits. The ancient barrier beaches, termed *Ingleside*, consist of three distinct topographic ridges, inland but roughly parallel to the present coast; these have been correlated with similar features from southern Texas to parts of Louisiana. These old barrier islands generally have relief of about 3 meters and are about 1.6 kilometers (1 mile) wide. Submerged relict Beaumont (Ingleside) barrier beaches present on the gulf shelf have been speculated on in the literature, but no evidence of their presence was found in this study.

The Beaumont Formation consists of yellow, reddish-brown, grayish-green, and black clays, silty sands, and fine brown sand. Calcareous (caliche) nodules and shell fragments are also sometimes present. The surface of the Beaumont was deeply weathered and eroded during exposure in late Wisconsin-age; consequently, its surface sediment is usually stiff, dehydrated, and multicolored. These characteristics make it relatively easy to identify in outcrop, as well as in the cores taken during this study, except in the vicinity of inlets where deep erosion and subsequent filling by recent sediments has occurred. Because of the sediment's dense character and uneven eroded surface, it generally creates a strong and distinctive acoustic reflector that is traceable on seismic profiles over nearly the entire study area.

c. Deweyville Formation. Deweyville sediments are late Wisconsin-age and overlie the Beaumont. Bernard (1950) describes them as clayey silts and silty fine sands with minor occurrences of sand. They are younger than 30,000 years and grade into Holocene-age sediments. Their exposure on land is apparently limited and their presence on the shelf is unknown.

d. Holocene-Modern Sediments. Several authors working in different geographic areas have placed the Pleistocene-Holocene boundary at 12,000 to 20,000 years ago. This is the time when the world climate moderated and ice sheets from the latest glaciation (Wisconsin) began to melt and release water to the ocean basins with a consequent elevation of sea level to the present level.

This rise in sea level is shown in Figure 10, which depicts a steady rise until about 4,500 years ago at which time the curve changed to a more gradual slope. The time from about 4,500 years ago to the present is termed modern. Presently, sea level in relation to land at Galveston is rising about 40 centimeters (1.4 feet) per century (Hicks, 1972). This figure is based on measurements taken from 1940 to 1970, and is complicated by documented subsidence in the Galveston region due to both natural and man-induced causes. The Holocene and modern sedimentary deposits along the Texas coast consist of fluvial flood plain and deltaic

sediments as well as fine-grained materials in the lagoons and on parts of the open shelf. Very fine and fine grained sand comprises the beaches and dunes.

In the study area, marine nearshore processes have been dominant in forming the barrier islands and in modifying the physiography of the region. Galveston Island is probably the best known example of a barrier island that has prograded seaward from about 3,500 to at least 800 years ago, based on research by LeBlanc and Bernard (1954), Bernard, LeBlanc, and Major (1962), Lankford and Rehkemper (1969), and Bernard, et al. (1970). Both Galveston Island and Bolivar Peninsula are characterized by elongate, abandoned beach ridges separated by low swales which parallel the present shoreline. The ridges indicate the islands have accreted seaward. The source of this sand is thought to be the Sabine River and other rivers to the east (Bernard, Major, and Parrott, 1959). Figure 11, which shows a cross section of Galveston Island based on borings, indicates the maximum thickness of Holocene sands occurs in the center of the island. The Pleistocene erosion surface underlies the island at about -12 meters (40 feet) and has a gentle seaward slope. Figure 12 shows that the Pleistocene surface remains at about the same elevation under the eastern part of Galveston Island, but at Bolivar Roads there is a deeply incised river channel with a thalweg depth of -31 meters (-120 feet) filled with Holocene sands and muds. Rehkemper's (1969) interpretations of a number of borings show that this channel is the ancestral Trinity River which was deeply incised during Pleistocene low stands of sea level.

III. RESULTS

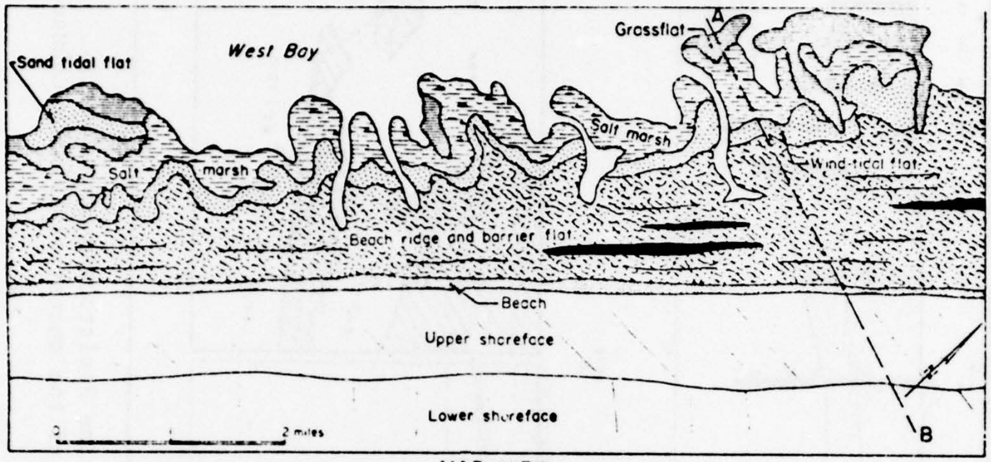
1. Continental Shelf Morphology.

The Continental Shelf width varies from a maximum of 232 kilometers (145 miles) off the Texas-Louisiana boundary to about 112 kilometers (70 miles) off Matagorda Bay. As shown by the 18.3-meter contour in Figure 3, considerable change in sea floor slope occurs in the study area between High Island and Freeport. The inner shelf off High Island is extremely flat and featureless with a slope of 0.2 meter per kilometer (1.7 feet per mile); off Freeport, the 18.3-meter contour is 12.6 kilometers (7 miles) offshore and the shelf is considerably steeper with a slope of 1.5 meters per kilometer (9.2 feet per mile).

2. Shallow Subbottom Structure and Stratigraphy.

The morphology and geologic character of the sea floor and Coastal Plain in the study area are directly related to past and present geologic conditions such as erosional and depositional processes, uplift and subsidence, sources and quantities of sediment supply, and the worldwide rises and falls of sea level due to fluctuations in the climate.

a. Planar Reflectors and Channels. The CERC seismic profiles contain several very prominent reflectors which are traceable over much of



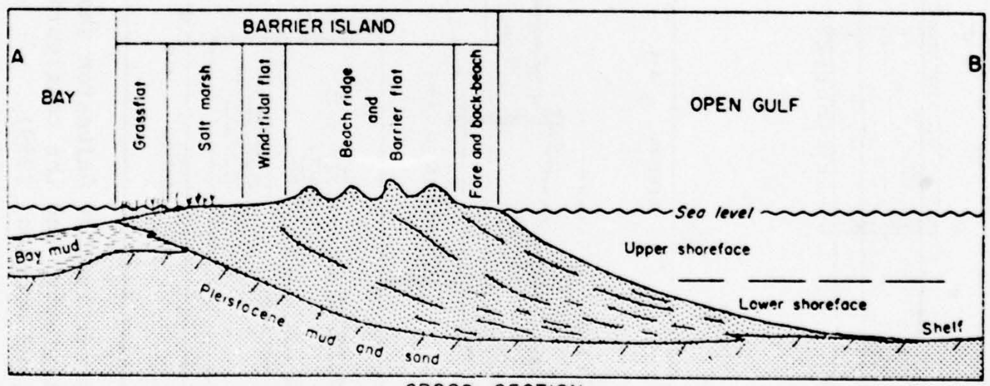


Figure 11. Modern environments and facies on the Galveston barrier island. Radiocarbon-age dates and beach ridge patterns show that the island has historically prograded seaward. Map is from Fisher, et al. (1972), and cross section is from Bernard, et al. (1970).

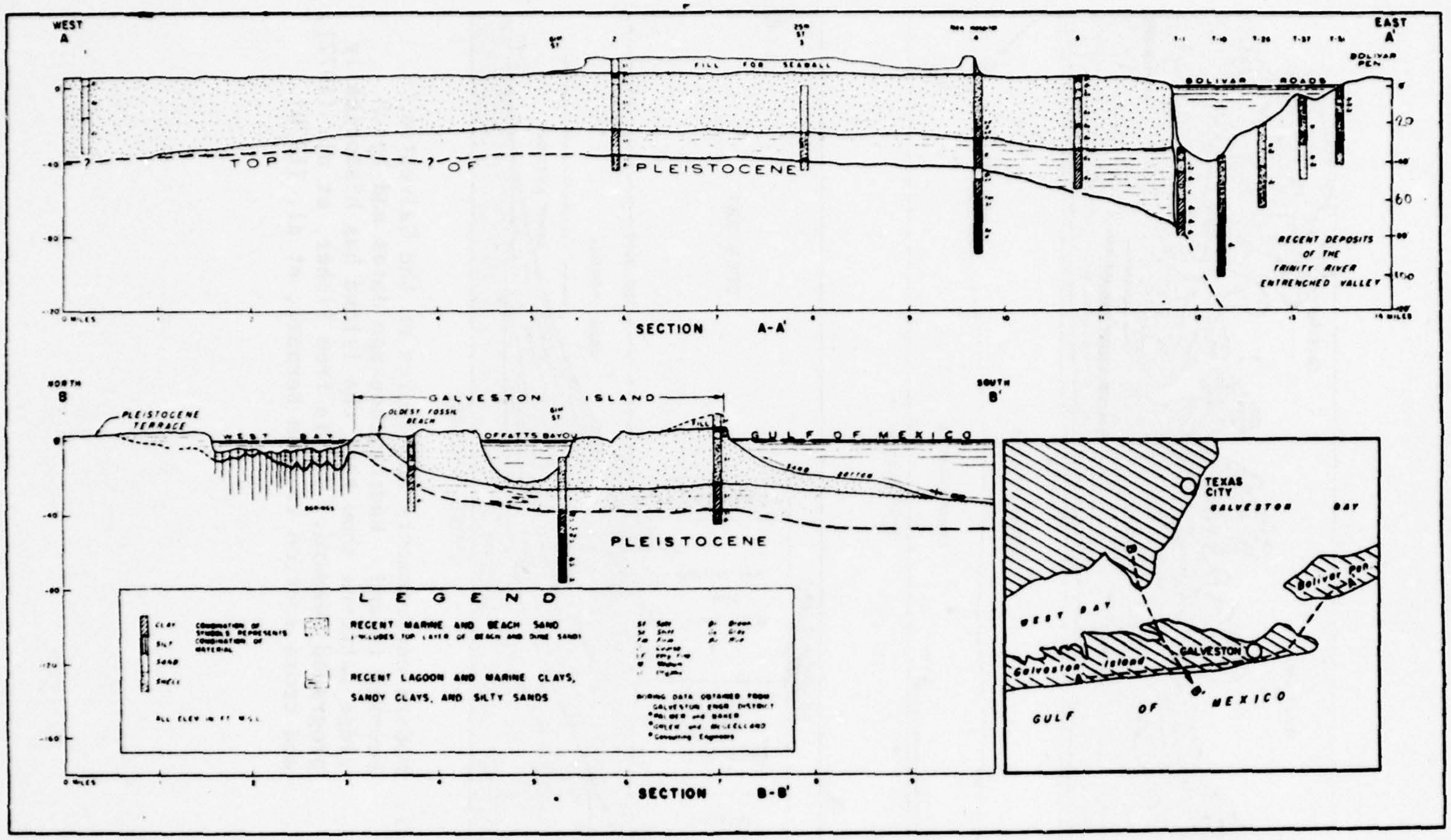


Figure 12. Geologic cross sections at Galveston showing the Pleistocene unconformity, Holocene stratigraphy, and the configuration of the ancestral Trinity Channel (from LeBlanc and Hodgson, 1959).

the study area. Most can be related to past transgressions and regressions of the sea across the shelf, and many deeply incised stream channels are evident. These channels record the positions of ancient rivers which once flowed across the shelf during low stands of sea level. All of the channels were subsequently filled with sediment and several show evidence of postfill erosion. (It is usually impossible to trace a channel from one seismic profile to an adjacent profile because line spacing is too great.) Ancestral shelf surfaces had low relief and the rivers meandered across broad flood plains, much as they do today. Most of the channels appear to be oriented perpendicular to the modern shore and several show alinement with subaerial channels onshore. The combined Trinity-San Jacinto River channel which underlies Galveston Inlet is several kilometers wide and the largest in the area. Its size indicates that the Trinity and San Jacinto Rivers are at least 100,000 years old and have occupied only one channel on the shelf. Other sizeable channels which cut into the Pleistocene surface are located just west of High Island, immediately east and offshore of Crystal Beach on Bolivar Peninsula, and just west of Freeport Inlet (the ancestral Brazos channel). These channels are generally filled with Holocene fine-grained cohesive sediments. A prominent reflector in the area marks the contact between the Pleistocene erosion surface (top Beaumont Formation) and overlying Holocene sediments. This reflector is a good mappable horizon in all parts of the area except in the vicinity of Galveston Inlet, San Luis Pass, and Freeport Inlet where distinctions between Holocene and Pleistocene sediments are difficult because of deep fluvial erosion and subsequent filling. The depth of the reflector on the records correlates well in many cores with the contact between greenish-gray and reddish-brown indurated clay and softer grayish-brown overlying modern sediments. This reflector also correlates well with the top of reported Pleistocene elevations and with stratigraphy contained in boring logs from Galveston Inlet, San Luis Pass, and Freeport Inlet.

b. Faults. Faults are evident on many seismic profiles in the eastern part of the area but none were observed west of Galveston Inlet. Most of the fault surfaces are vertical and maximum displacement is about 2 to 3 meters (6 to 10 feet). Tracing a fault between adjacent seismic lines, even though the lines are only several kilometers apart, is difficult which suggests the faults are minor flexures possibly related to the salt-dome tectonics of High Island. All faults seem restricted to Pleistocene sediments and many extend to the sea floor where Holocene cover is absent. No evidence of displaced Holocene sediments or fault relief on the sea floor was observed to suggest that movements along these faults occur at present or have occurred in the recent past.

3. Primary Sediment Classes.

a. General. Data from the 34 cores collected during this study, along with information on the TBEG map showing surficial sediment distributions based on several hundred grab samples, provide the ground-truth information on surficial and shallow subbottom sediments within the study area. The seismic profiles were used to extrapolate the sediment

information from the core and grab sample sites to adjacent sea floor areas. The TBEG map actually contains 38 sediment descriptors; however, such detail was not appropriate for this study so the sediments were grouped into the four primary classes (Fig. 13). Detailed descriptions of each core are contained in Appendix A, and textural analyses of the sand fractions are included in Appendix B.

The Wentworth scale for soil classification was used for describing sediment textures and size classifications in this report. Table 1 shows that classification and the Unified Soil Classification (USC), as well as the relationship between grain-size diameters in millimeters (mm) and phi (ϕ) units.

b. Mud. The most common sediment type found in the study area is a mixture of silt and clay termed *mud* in this report. (Mud constitutes all materials with grain diameters smaller than 0.063 millimeter or > 4 phi.) The mud occurs over much of the study area seaward of the shoreface (Fig. 13). When wet, the mud is generally greenish-gray to dark gray in color, soft, and fairly cohesive; however, the mud becomes denser and harder when dried. In most places, the mud occurs as a horizontally stratified veneer and secondarily as fill material in several of the buried ancestral stream channels which transect the shelf. Evidence of a high degree of bioturbation, a low shear strength and high moisture content, and a relationship of the mud to deeper deposits on the seismic records and in the cores suggests deposition by modern hydraulic shelf processes.

c. Sand. Sand recovered in the cores does not exhibit much diversity in compositional and textural character. It is predominantly quartz, generally of very fine to fine grained size (0.063 to 0.25 millimeter, 4 to 2 phi), and is poorly to well sorted. Most clean sand (free of fines) appears moderate to well sorted, and is found only in the shoal area adjacent to the Galveston south jetty, the ebb tidal shoal at San Luis Pass, and parts of the shoreface region of Bolivar Peninsula and of Galveston Island west to within about 2.4 kilometers (1.5 miles) of Surfside Beach (Fig. 13). Its presence in this area is based on infor-mation in Fisher, et al. (1972, 1973). The width of the shoreface sand body (distance from shore to the sand-mud boundary) varies from about 0.4 kilometer (0.25 mile) off central Galveston Island to about 2.5 kilometers (1.6 miles) off San Luis Pass and the eastern end of Galveston Island. The sand width in other areas averages about 1.6 to 2.4 kilometers (1 to 1.5 miles). East of Galveston Inlet to High Island, clean sand is noticeably absent from any of the CERC cores or the TBEG grab samples.

d. Stiff Clay. Greenish-gray to reddish-brown and yellow stiff clay was found in 22 of the 34 cores and in several grab samples. The clay generally appears leached and oxidized and locally contains ferruginous and calcareous nodules. Its physical character, relationship to overlying modern sediments, and position and configuration on the seismic records suggest that the top of the clay is an erosion surface that was exposed to subaerial processes before sea level rose to present levels. As shown in

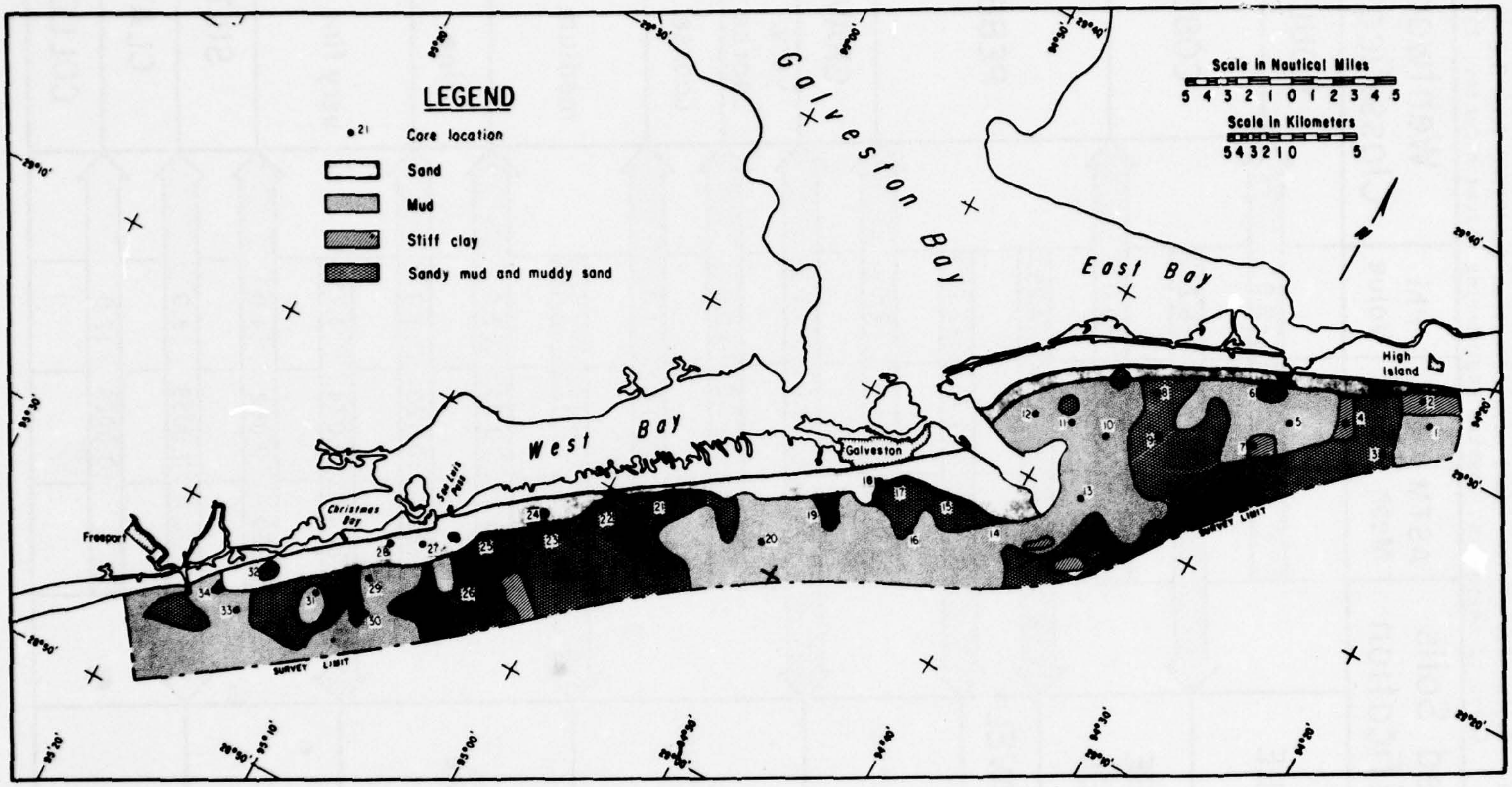


Figure 13. The four primary sediment types on the inner shelf surface, determined from the CERC cores and seismic records and from TBEG grab samples.

Table 1. Grain-size scales--soil classification (modified from U.S. Army, Corps of Engineers, Coastal Engineering Research Center, 1977).

Unified Soils Classification	ASTM Mesh	mm Size	Phi Value	Wentworth Classification
COBBLE				BOULDER
		256.0	-8.0	
				COBBLE
		76.0	-6.25	
COARSE GRAVEL				
		64.0	-6.0	
				PEBBLE
		19.0	-4.25	
FINE GRAVEL				
	4	4.76	-2.25	
SAND coarse				
	5	4.0	-2.0	
				GRAVEL
	10	2.0	-1.0	
SAND medium				SAND very coarse
	18	1.0	0.0	
				SAND coarse
	25	0.5	1.0	
				SAND medium
	40	0.42	1.25	
SAND fine				
	60	0.25	2.0	
				SAND fine
	120	0.125	3.0	
				SAND very fine
	200	0.074	3.75	
SILT				
	230	0.062	4.0	
				SILT
		0.0039	8.0	
CLAY				CLAY
		0.0024	12.0	
				COLLOID

Figure 13, the clay actually crops out at the sea floor in several areas (e.g., cores 4 and 7); in other areas it is covered by a relatively thin mantle of Holocene muds and muddy sands.

e. Sediment Age. Sediment properties and faunal content indicate that some sediments recovered in the cores are part of the modern shelf and nearshore sediment blanket, and other sediments are from various relict deposits. Distinctions between the modern sediments and underlying relict sediments are relatively clear in most cases; however, more subtle gradations occur in places, such as adjacent to the inlets and in the Galveston Bay dredged-material disposal area.

Modern sediments are usually characterized in bulk by their gray to grayish-brown color and low shear strength. Microscopic examination shows that the principal sand-size components are subangular quartz particles with various amounts of fragmented mollusk shells, echinoid tests, ostracod carapaces, and foraminiferal tests. The most common inorganic accessory minerals are opaques dominated by pale-olive to dark-green glauconite grains. The foraminiferal fauna is a typical low diversity marginal marine assemblage dominated by *Ammonia beccarii* (Linne) and several species of *Elphidium*.

Most of the relict sediments appear to belong to two widespread deposits underlying the surficial modern sediment blanket. The largest of these is a stiff clay, with interbedded sand layers, which is nearly ubiquitous in cores 19 through 32 (Fig. 13). Typically, the clay is a yellow to reddish-brown color, massive, and very stiff. Residues from washing the clay through a U.S. Standard 230-sieve (0.063 millimeter or 4 phi) generally consist of a small amount of quartz grains.

The sand, which appears to be interbedded with the stiff clay, is usually reddish-brown in color, well sorted, and consists predominantly of quartz particles. In contrast to the surficial modern sediments, samples of this deposit contain little or no faunal remains or glauconite grains. Seismic data as well as lithology indicate that the stiff clay and associated sand are part of the Pleistocene Beaumont Formation.

The other extensive relict deposit occurs in the eastern part of the study area (cores 1, 2, 4, 5, 6, and 7; Fig. 13). This deposit consists of muddy sand with abundant shells and shell fragments of the marsh clam (*Rangia* sp.). The sand fraction contains little or no glauconite and the sparse, marginal marine foraminiferal fauna is usually dominated by *Ammonia beccarii* (Linne). The presence of *Rangia* sp. indicates these sediments were deposited in a back-barrier lagoon or estuary and not in the existing open marine environment. This deposit may be either Pleistocene-age or have been deposited during the Holocene transgression.

A third group of deposits consisting of gray to grayish-brown sand and mud is very similar in character to the modern sediment layer but contains small percentages of glauconite and a foraminiferal fauna characterized by a greater diversity as well as a larger number of *Quinqueloculina* sp. than

the clearly modern deposits. Whether this is a relict, possibly hypersaline lagoon, deposit or a facies of the modern sediment is unclear.

In summary, it appears that modern and relict deposits in the study area can be differentiated in most cases by bulk properties (i.e., shear strength, water content, density), glauconite content, the presence or absence of fauna, and in some cases by the nature of the faunal assemblage. More precise sediment age determinations will be available when the results from seven radiocarbon-14 analyses are made on shells and wood fragments in cores 1, 2, 4, 7, 14, and 28.

4. Suitability of Sandfill for Beach Nourishment.

The suitability of sand as fill material in the restoration and maintenance of beaches depends on such factors as mineralogic composition, transport distance from the project site, percentage of fine-grained sediments, means of dredging, methods of transport and placement, grain size, and total grain-size distribution (degree of sorting). The relation of these factors to the total design of beach fills is discussed in Krumbein and James (1965), James (1974, 1975), Dean (1974), Hobson (1977), and in pages 5-9 to 5-18 of the SPM (U.S. Army, Corps of Engineers, Coastal Engineering Research Center, 1977).

Borrow material should be at least the same size or, preferably, slightly coarser than native material on the beach to be nourished. Borrow material that is significantly finer in grain size than native sand will probably be less stable than the natural material and hence more easily eroded. The net effect would be an accelerated retreat of the beach in an attempt to readjust nearshore profiles which would require considerably larger volumes of initial fill as well as more frequent nourishment. If the borrow sand does not have the same grain-size characteristics as the native beach sand, the grain-size population of the borrow sand should have a greater variation in grain size than the native beach sand. However, the borrow sand should not contain large amounts of fine-grained silts and clays (< 0.063 millimeter or > 4 phi) which, if placed on the beach, would soon be introducted to the nearshore zone. Turbidity caused by the solids could have a detrimental impact on native marine fauna and also be esthetically displeasing. Borrow material should also be composed of hard, chemically and physically resistant minerals (e.g., quartz) which will not readily degrade in the high-energy nearshore beach-dune environment.

The grain size of native beach sand decreases from High Island west to Surfside (Fig. 14), but all the beach sand is in the very fine to fine grain-size range (0.063 to 0.25 millimeter, 4 to 2 phi). Most beach sand is moderately sorted (0.71 to 1.0 millimeter) to very well sorted (< 0.35 millimeter). Borrow material should ideally meet or exceed these size and sorting criteria.

5. Dredging Effects on the Shore.

Another factor to be carefully evaluated when considering offshore sand as a source of fill in beach nourishment is the possible effects of

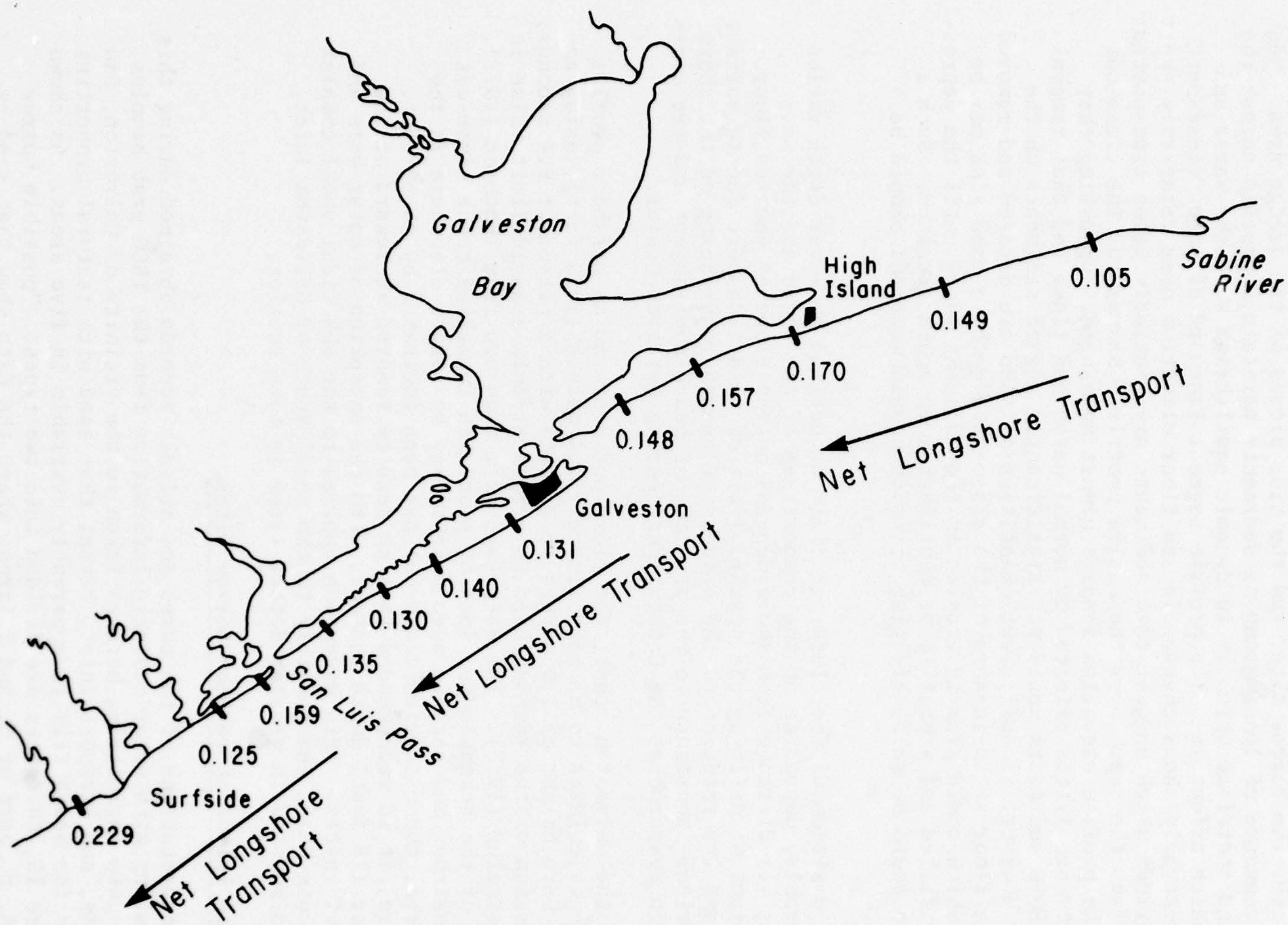


Figure 14. Mean grain-size diameter (in millimeters) for native beach sands along the Texas coast from the Sabine River to Surfside Beach (modified from Hsu, 1960).

dredging on the stability of the adjacent coast. Some important variables are the distance of the potential fill from the adjacent shore, the water depths over the borrow site, and the side slopes of the dredge area. Most shores composed of loose granular sediments maintain a profile across the beach and shoreface which is in dynamic equilibrium with the waves and tides which affect it. The profile segment landward of some "close-out" depth generally shows changes in sea floor elevation over relatively short time periods which suggest that sediments are routinely being transported to and from the beach over the entire profile. Seaward of the close-out depth the profile elevation remains almost unchanged, suggesting that sediments are little affected by normal waves and tides and that removal of offshore sediments would not significantly affect sediments on the beach. However, if sufficient quantities of sand are dredged and removed from sea floor areas inshore of the close-out depth, a sand sink may be formed which could promote erosion on the adjacent shore until the depression is filled and a profile of equilibrium is again attained. Such a practice would be self-defeating to beach nourishment and should be avoided.

The position of the close-out limit as defined by water depth varies considerably, depending on the composition of the shore and the wave climate; its distance from shore depends on the slope of the sea floor. The subject of defining the seaward limit of sand transport due to surface waves, and its relation to the effects of nearshore dredging on the shore are of vital importance to the practice of beach nourishment and are areas of active research at the Coastal Engineering Research Center.

For the Galveston coast, the close-out depth on an offshore profile has been calculated to be approximately 4.4 meters (14.5 feet), using an extreme wave height of 1.9 meters (6.2 feet) with a period of 9.4 seconds. A discussion of the methods used to arrive at this seaward-limit value is in Hallermeier (1977). The wave gage data used are from Thompson (1977). Because of the acknowledged lack of precision in making these close-out determinations and because wave heights may be larger elsewhere in the study area, the estimated close-out has been increased by 25 percent. Therefore, it is recommended that no sand be removed shoreward of the 5.5-meter (18 feet) depth contour, with the exception of outer bars and shoals of inlets. This exception applies to the ebb tidal shoal complex at San Luis Pass, and possibly to the shoal south of Galveston Inlet, and is discussed in greater detail later in this section.

6. Potential Offshore Sand Borrow Sites.

Interpretations of the cores and seismic records obtained during this study, along with other geologic information from the TBEG grab samples and the deep engineering borings taken in the vicinity of Galveston, San Luis Pass, and Freeport Inlet, reveal that sand with textural properties suitable for beach fill is apparently available in five areas. As shown in Figure 15, the sites are divided into two types: "possible borrow areas" A, B, part of C, and E (areas where the data show that sand is available but may be low quality due to the presence of silt and clay

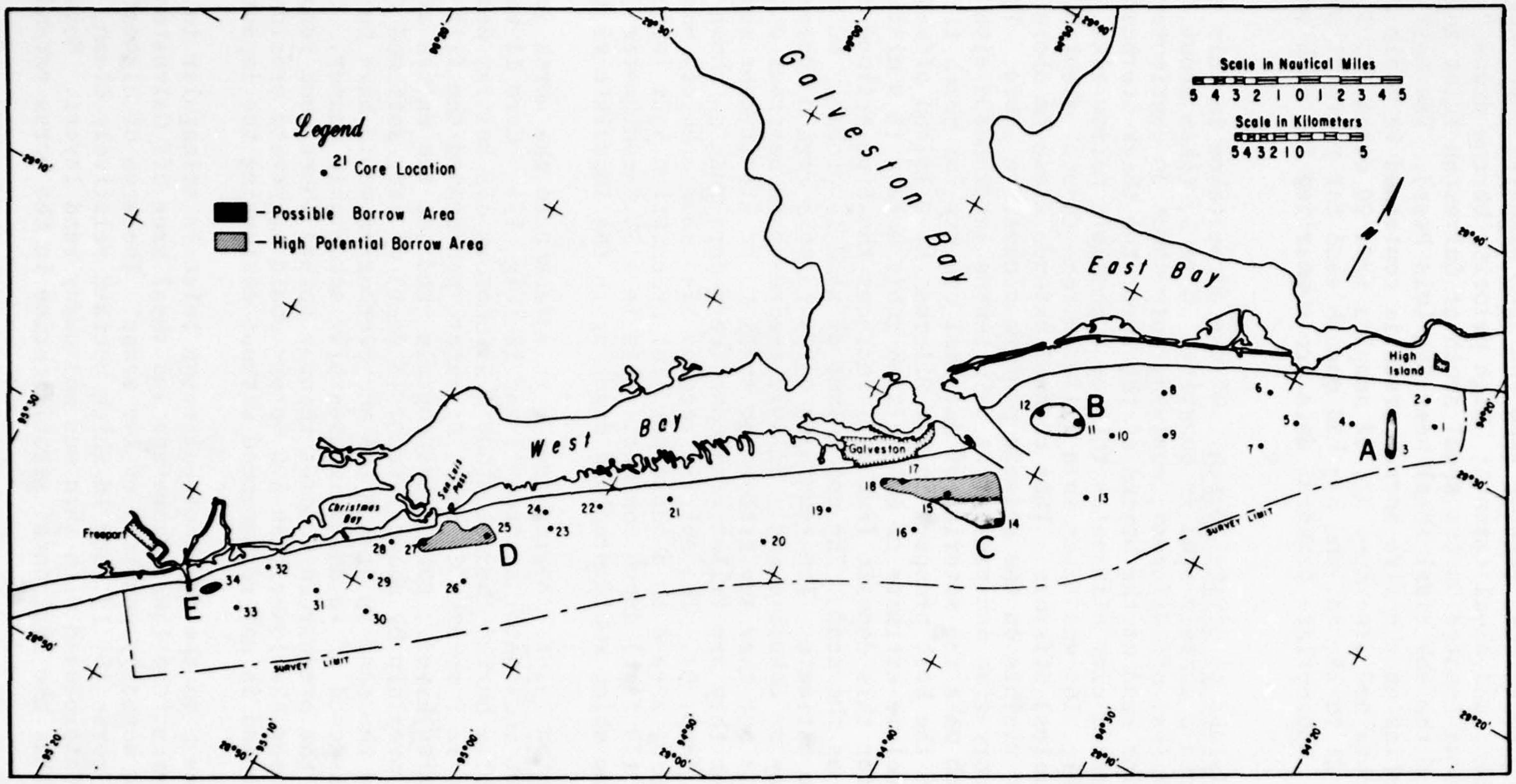


Figure 15. Map of five sites (A to E) selected as possible locations for obtaining sand for beach nourishment.

size sediments, or seismic records show the sand deposits vary considerably in thickness and areal extent); "high priority borrow areas," part of C and D (areas located on the shoal south of Galveston Inlet and in the vicinity of the ebb tidal shoal near San Luis Pass). The most pertinent information on the five borrow areas is contained in Table 2. Of the 34 cores obtained (see App. A), 84 samples from 20 cores (3, 5, 11, 12, 14 to 19, 21 to 28, 33, and 34) had enough sand for textural analysis (see App. B). Appropriate textural data are summarized for each borrow area in Table 2.

a. High Island to Crystal Beach. Of the cores taken in this region, only cores 3 and 5 contain sand in quantity. Core 5, taken about 4 kilometers (2.5 miles) off Gilcrest, contains only about 30 centimeters (1 foot) of fine sand at the bottom of the core; the thick overburden of soft mud and stiff clay eliminates this as a possible borrow site. Core 3 in area A (Fig. 16) was taken in a filled stream channel about 5.5 kilometers (3.3 miles) offshore. This channel extends close to shore (Fig. 16) but is not visible on the seismic profile closest to shore. The sand in core 3 is very fine and present as thin lenses interbedded with silts and clays which make the material of marginal quality for beach fill. However, it is the best prospect in the Gilcrest-High Island offshore region. The volume estimate of 6.8 million cubic meters (8.9 million cubic yards) for this deposit (Table 2) includes the fine-grained constituents as well as the sand. The net volume of sand is probably 50 to 70 percent of the estimate. The remaining cores in this region contain stiff gray-green clay or cohesive mud. Seismic records show numerous other buried channels but they are either too small to be significant sand repositories or they are filled with cohesive modern muds as shown in cores 8 and 9 (App. A). The seismic records also show a thinly buried pipeline crossing area A in a shore-parallel orientation just inshore of the 9.1-meter (30 feet) depth contour. This is a 50.8-centimeter (20 inches) gasline which would preclude dredging in the immediate vicinity.

b. Galveston Inlet. Borrow area B is adjacent to the north jetty of Galveston Inlet and contains cores 11 and 12 (Fig. 17). Core 11 was taken on the flank of a buried channel about 4 kilometers off Bolivar Beach; core 12, taken in 7 meters (23 feet) of water, penetrated the fill of the ancestral Trinity River. Both cores contain sand but the entire area appears to be overlain by about 1 meter (3 feet) of very soft mud (Table 2). To remove the sand in area B the mud overburden would have to be removed and disposed of in an environmentally acceptable manner. It is possible that the overburden becomes thinner toward shore, but removal of material in water shallower than 5.5 meters could aggrevate erosion on the adjacent shore and is not recommended without evaluating the impact.

Borrow area C to the south of Galveston Inlet is triangular in plan view and comprises the lower shoreface and shoal area off Galveston Beach (Fig. 17). It actually consists of two areas. The area of highest potential includes cores 15, 17, and 18 which contain relatively clean, fine-grained sand interbedded with thin mud and muddy sand layers. Seismic records show that the horizontal stratification in the cores extends

Table 2. Characteristics of possible borrow sites.

Designation	Core (No.)	Water depths (m)	Thickness (m)	Mean grain diameter (mm)	Standard deviation (phi units)	Mud overburden (m)	Area ($10^6 m^3$)	Est. volume ($10^6 m^3$)	Remarks
A	3	6 to 10	>2.3 ≤8.2	0.11 to 0.16	0.5 to 1.00	None	2.9	6.8[1]	Sand is interbedded with mud as channel fill. Buried 20-inch gasline crosses site and may be a hazard to dredging.
B	11	5.5 to 8.5	1.7	0.16 to 0.23	0.42 to 1.04	1.3	9.9	9.9[2]	Sand in C-11 occurs as basal channel fill and Pleistocene erosion surface. Sand in C-12 occurs in two layers separated by 0.9 meter of mud and sandy mud.
	12		1	0.16 to 0.23	0.50 to 1.39	1			
C	14		2	0.12 to 0.19	0.51 to 1.06	None	27.6	20.6[3]	Sand in C-14 is interbedded with muddy sand in dredge disposal area. Sand in C-15 occurs in two layers separated by 1.6 meters of mud and sandy mud. Sand in 17 and 18 is interbedded with muddy sand.
	15	5.5 to 9.8	0.3 ≥0.5	0.12 to 0.19	0.53 to 1.02	0.4			
	17		>5.4 ≤9.1	0.13 to 0.17	0.40 to 0.81	0.7			
	18		4	0.10 to 0.16	0.43 to 0.78	None			
D	25	1.5 to 9.1	>1.5 ≤9.1	0.13 to 0.24	0.37 to 0.60	None	12.6	23.2[4]	
	27			0.15 to 0.17	0.57 to 1.24	None			
E	34	5.5 to 7	2.5	0.10 to 0.12	0.61 to 0.88	0.1	0.8	2.1[5]	Muddy sand in C-34 possibly part of the relict Brazos River delta.

[1]Based on thickness of 2.3 meters.
[2]Based on thickness of 1 meter.
[3]Based on thickness of 1 meter in high potential area and 0.5 meter in possible area.
[4]Based on thickness of 2 meters.
[5]Based on thickness of 2.5 meters.

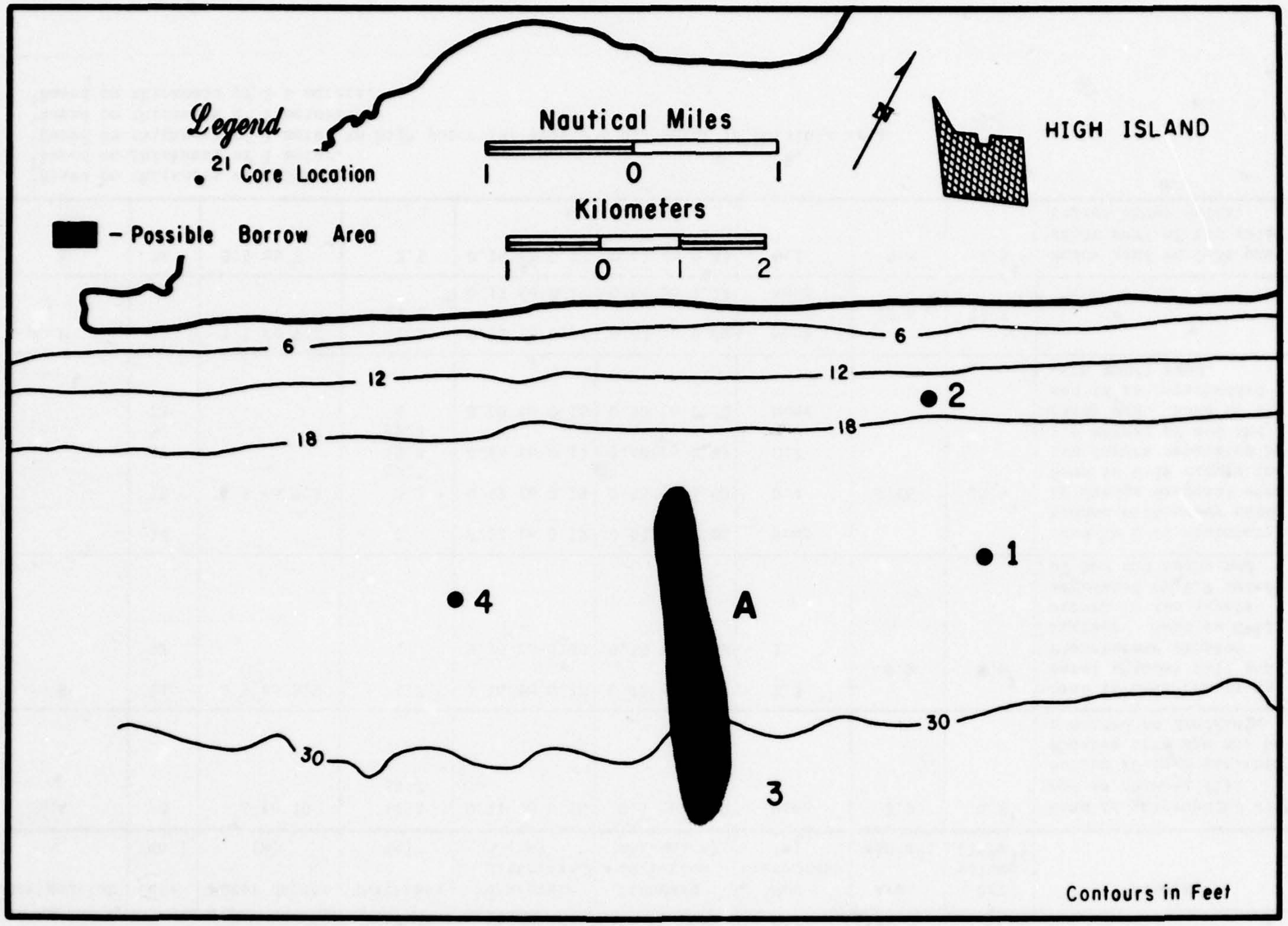


Figure 16. Possible borrow area A, which is confined to a relict buried stream channel cut into the Pleistocene erosion surface.

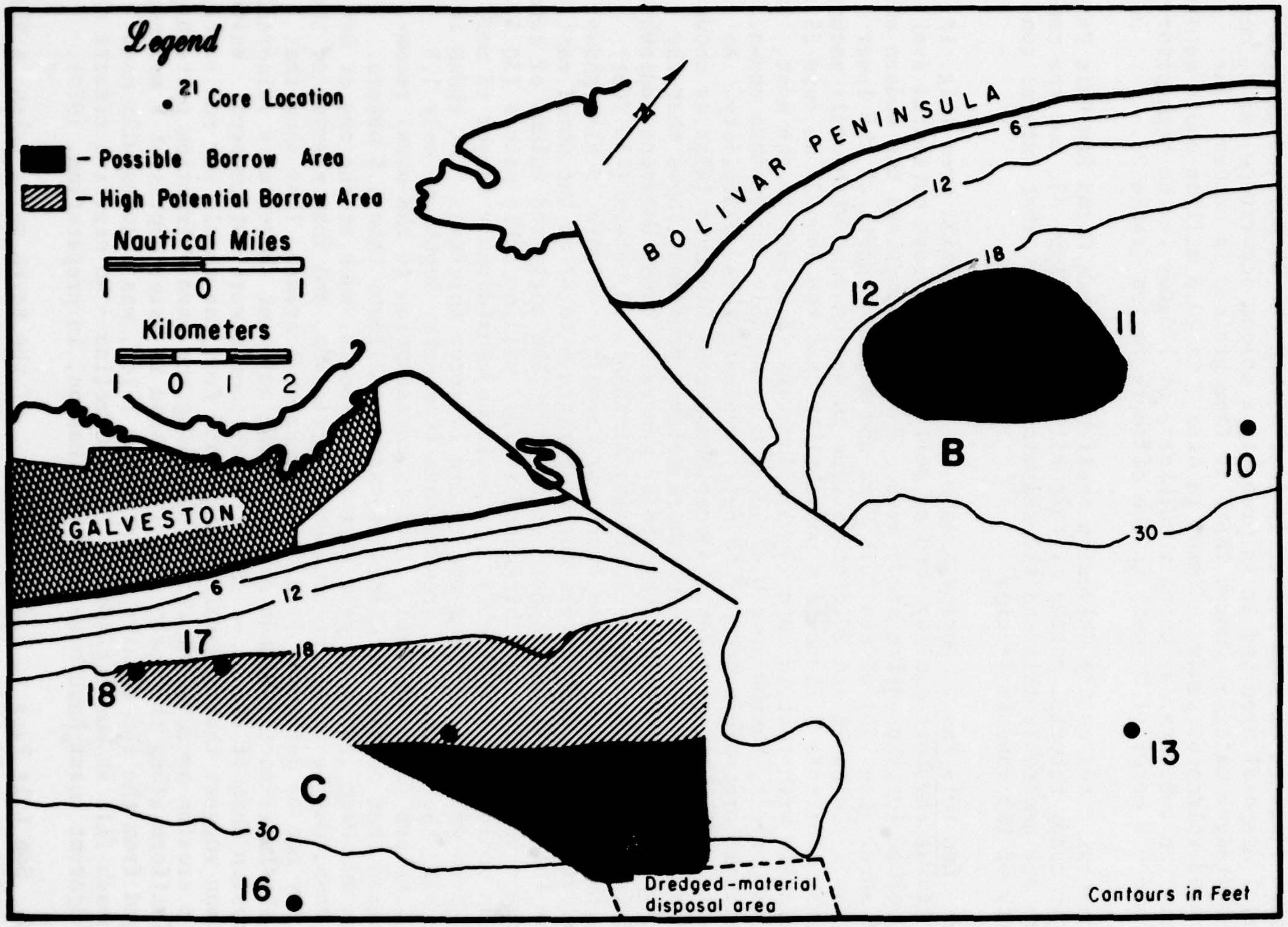


Figure 17. Map of possible borrow site B, and site C which has a high potential inshore area.

throughout the borrow area but the sediments probably become progressively finer seaward from core 15. Core 14 at the seaward boundary of the area contains 2 meters of sand but it is just within the authorized dredged-material disposal area and it is probably a unique occurrence, since most of the dredged material dumped there is fine grained in nature. The estimated volume of sandy sediment in area C is 20.6 million cubic meters (27 million cubic yards) using a thickness of 1 meter in the high priority area and 0.5 meter (1.6 feet) in the offshore region (Table 2).

Several cores on the Galveston shelf between area C and San Luis Pass contain sandy material worthy of textural analysis (App. A), but the sand layers are generally thin and the seismic data suggest that lateral continuity of the sand is lacking.

c. San Luis Pass. Borrow area D is a high potential area (Fig. 18); it contains the best quality sand as well as the largest estimated available volume for the entire study area. The area comprises the modern ebb tidal shoal (Fig. 19) of San Luis Pass and adjacent parts of the lower shoreface. Cores 26 and 27 contain fine to medium sand with small amounts of finer sediments. There is a possibility that the deposit in core 25 is correlative with that in core 23, 5 kilometers (3 miles) to the east. If this is correct, borrow area D would be considerably larger than shown. Additional cores are necessary to fully evaluate this possibility. An analysis of 16 borings taken at locations across San Luis Inlet as shown in Figure 20, as well as the offshore seismic profiles, shows that the stratigraphy in the region consists of generally sandy Holocene sediments overlying the Pleistocene unconformity at about -10 meters (-33 feet) which is considered the depth limit for dredging. Figure 20 also shows sandy sediments about 9 meters thick (borings 4 to 8) on the shoal east of the inlet channel and inshore of area D. The estimated volume of sand in area D using a 2-meter thickness, is 23.2 million cubic meters (30.3 million cubic yards) (Table 2). It could be considerably larger if more shoal area were included for the entire 10-meter thickness. As shown in Figure 18, the recommended area extends from water depths of only 1.5 to 9.1 meters (5 to 30 feet). This is an exception to the usual recommendation that no sand be dredged in water shallower than 5.5 meters. Walton and Dean (1976) suggest that inlet shoals, such as the one at San Luis Pass, may be excellent sources of fill sand, and that removal of the sand may not be detrimental to adjacent coastal areas. They show that such shoals refract incident waves, making adjacent shores more vulnerable to erosion than if the inlet and offshore shoals were not present. Walton and Dean suggest that removal of fill sand from the shoals may indirectly reduce erosion on adjacent coasts by making the wave refraction patterns more uniform along the coast. In 1975, sand in water depths of 2 meters, dredged from the ebb tidal shoal at Fripp Inlet, was successfully used for beach fill at Hunting Island, South Carolina. No negative effects on the adjacent coast have been reported (Hobson, in preparation, 1979).

d. San Luis Pass to Freeport Inlet. Of the seven cores taken in this area, only core 34 (Fig. 21) contains enough sand to warrant designating the site (off Surfside Beach) a possible borrow area (area E). The sand

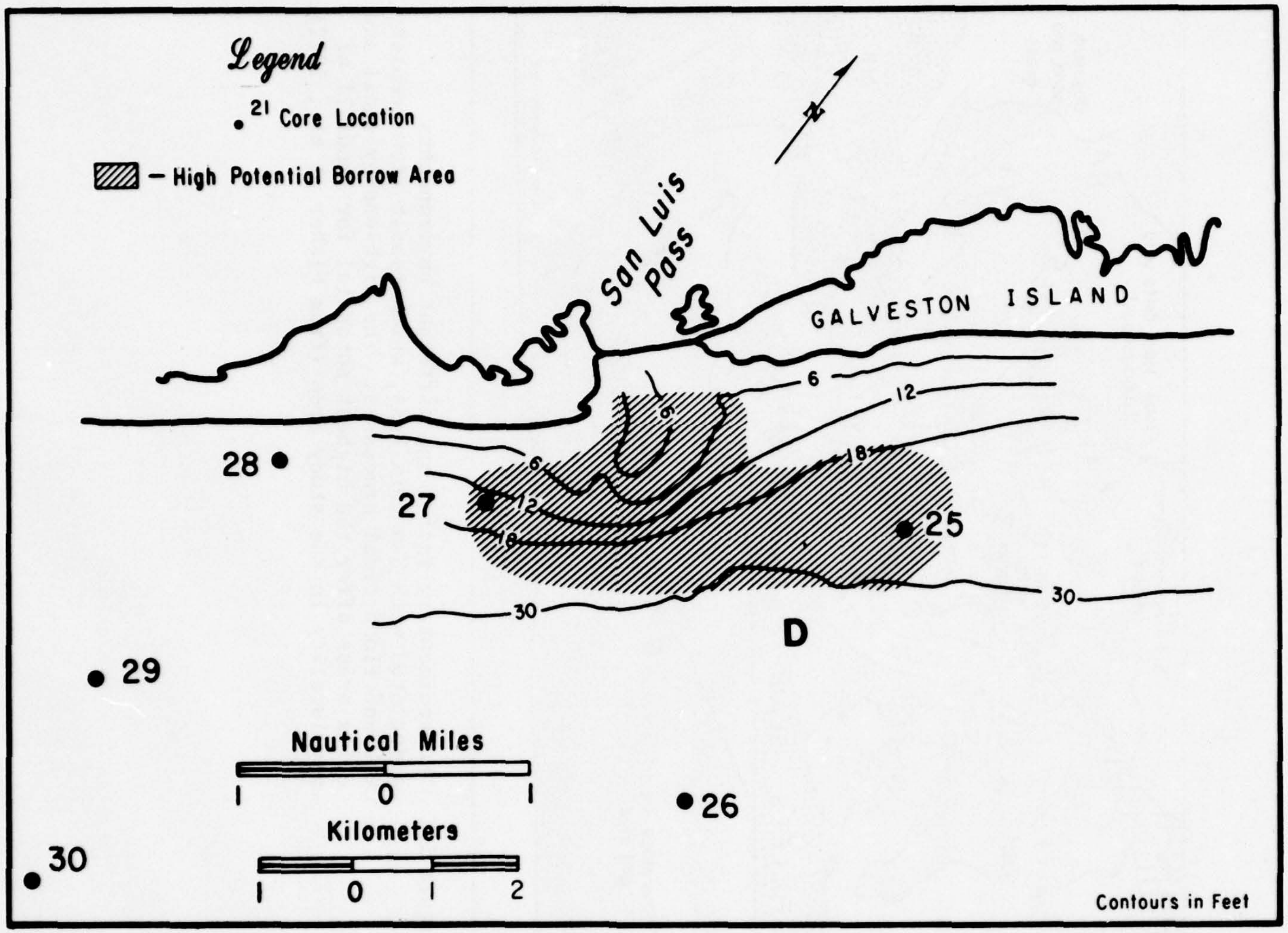


Figure 18. Borrow area D, which consists of the San Luis ebb tidal shoal and adjacent shoreface. Area D is the most promising site as a source of sandfill for beach nourishment.

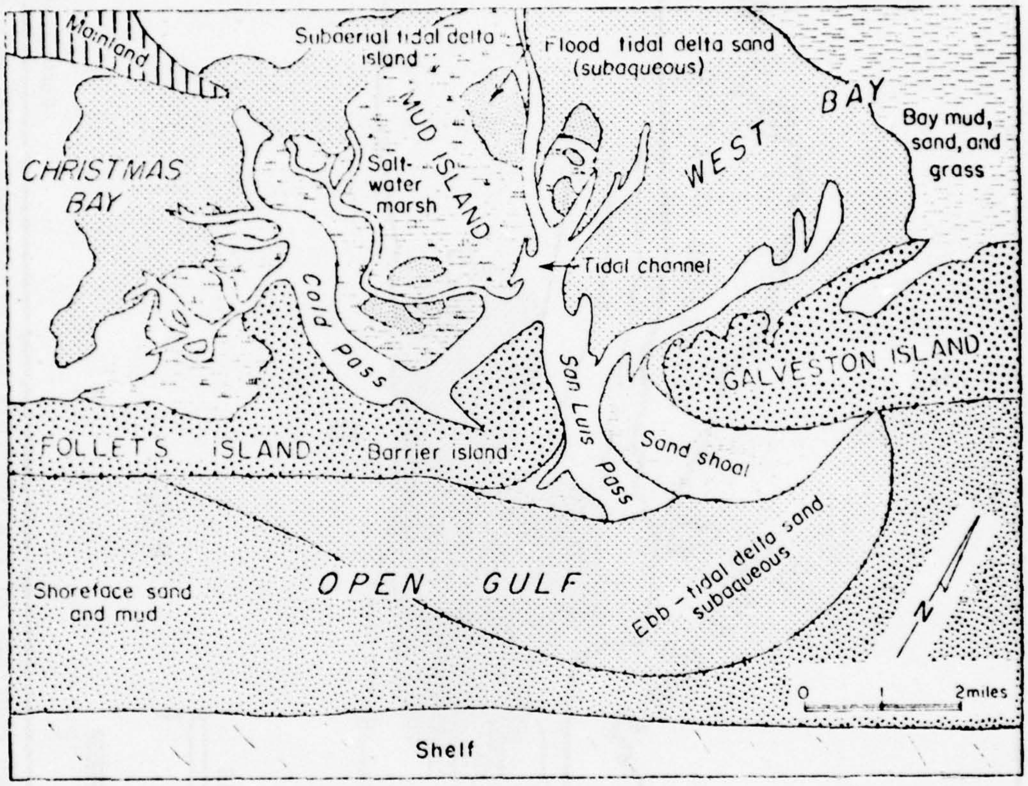


Figure 19. The sedimentary facies and different environments associated with San Luis Pass, which result from complex ebb and flood tidal processes. The high-energy shoal and delta areas offer the highest potential for sandfill of any locality in the study area (from Fisher et al., 1972).

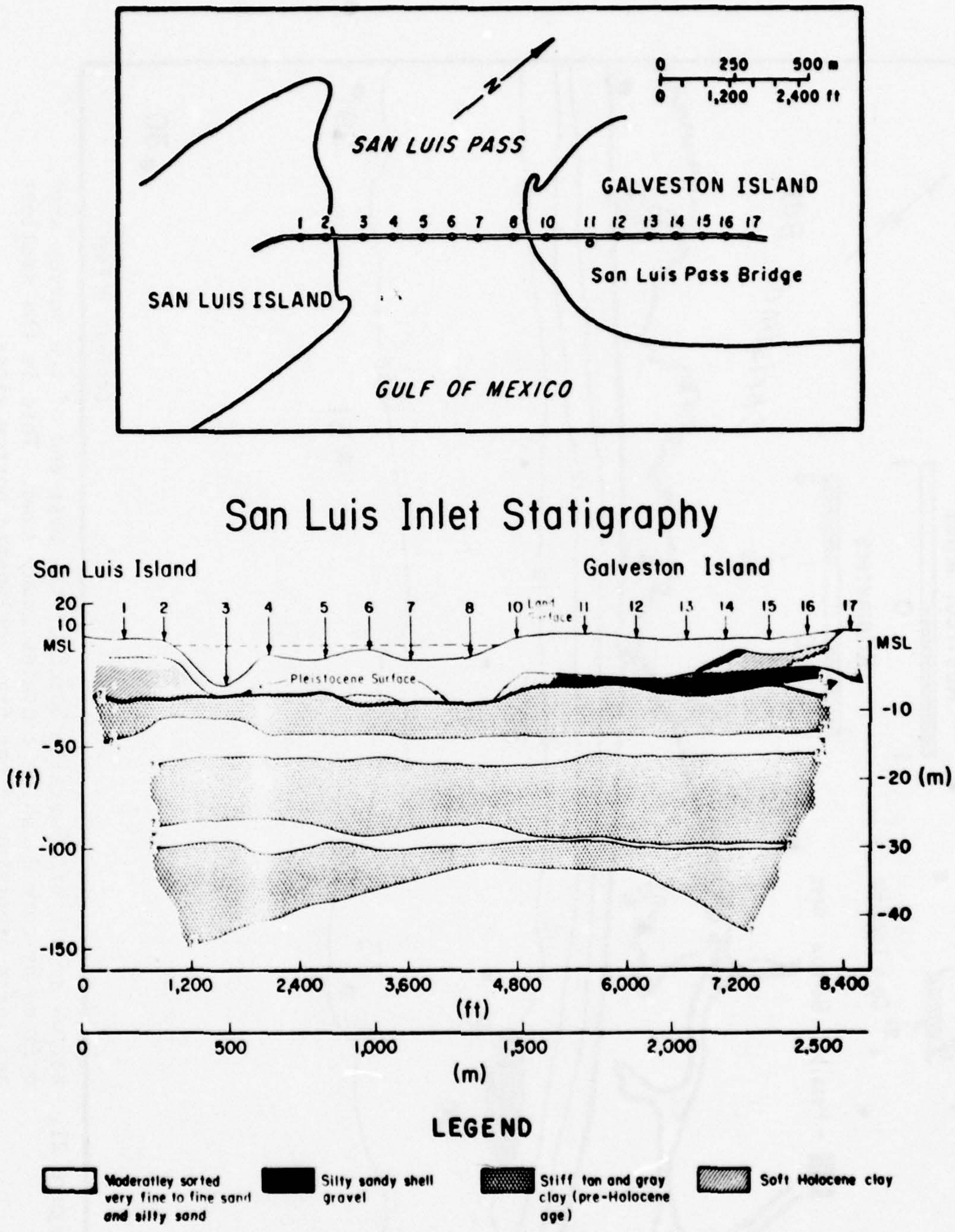


Figure 20. Quaternary stratigraphy at San Luis Pass based on interpretations of descriptive logs of 16 (boring 9 not taken) borings. The Pleistocene surface in this profile correlates well with offshore data and is used to define the lower boundary for Borrow Area D.

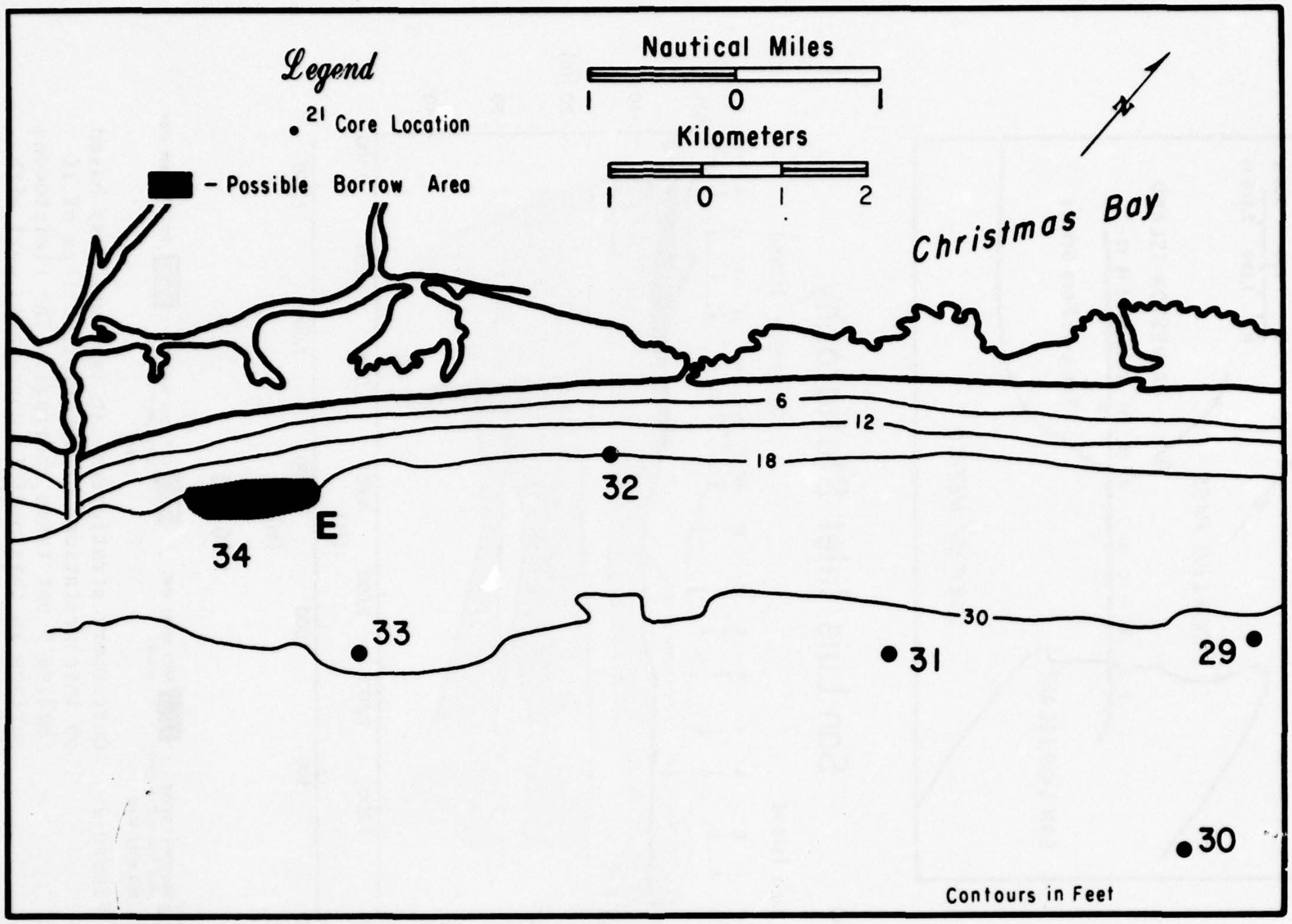


Figure 21. Borrow area E off Surfside Beach at the west end of the survey area, defined by core 34 which contains muddy sand. This is the smallest and least promising of the five designated borrow sites.

is very fine grained and mixed with varying percentages of silt and clay (Table 2; App. B). The area is also overlain by about 12 centimeters (5 inches) of mud which could be a detriment to dredging. Seismic records in the area show several buried stream channels close to core 34; it is likely that the sand in core 34 is part of one of these small channels or alternately is part of the ancestral delta of the Brazos River which entered the gulf near this location in the past. The estimated sand volume in area E is 2.1 million cubic meters (2.7 million square yards), based on a thickness of 2.5 meters (8.1 feet); however, deep dredging close to the shore could aggrevate the already serious erosion problems at Surfside Beach.

IV. SUMMARY AND RECOMMENDATIONS

The primary objective of this study was to determine the geologic character of the Texas inner shelf in order to evaluate the potential of sandy sediments suitable for nourishment of eroding beaches. Several hundred kilometers of high-resolution seismic reflection profiles were taken to identify the primary stratigraphic subbottom reflectors, buried stream channels, bars, and delta shoals in the area. Long cores were taken in 34 of the most promising sites and the seismic records were used to extrapolate the core stratigraphy to adjacent areas of the shelf. The major findings and recommendations are listed below.

a. The Pleistocene erosion surface is generally $\leq$ 3 meters below the sea floor, except for buried ancestral river channels, and because it is primarily composed of indurated clay, is considered the lower boundary for dredging of sand for beach nourishment.

b. None of the ancestral stream channels cut into Pleistocene sediments and filled with Holocene sediments contain high quality sand. However, a buried channel west of High Island contains muddy sand and is considered of marginal quality as a borrow site.

c. Five sites were selected as containing possible borrow material but only two, one at Galveston and one at San Luis Pass, were judged to be of high potential. The Galveston site consists of lower shoreface sand and a relict ebb tidal deltal complex; the San Luis Pass site comprises the modern outer bar and ebb tidal shoal complex. None of the sites contain any artifacts or structures of known archeological significance, and none contain obstructions that would interfere with dredging, except the gasline in area A.

d. Prior to project dredging, it is recommended that cores be taken in a dense grid matrix to provide more detailed information on the three-dimensional framework of the borrow site, as well as give additional textural data for proper design of the beach fill.

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APPENDIX A

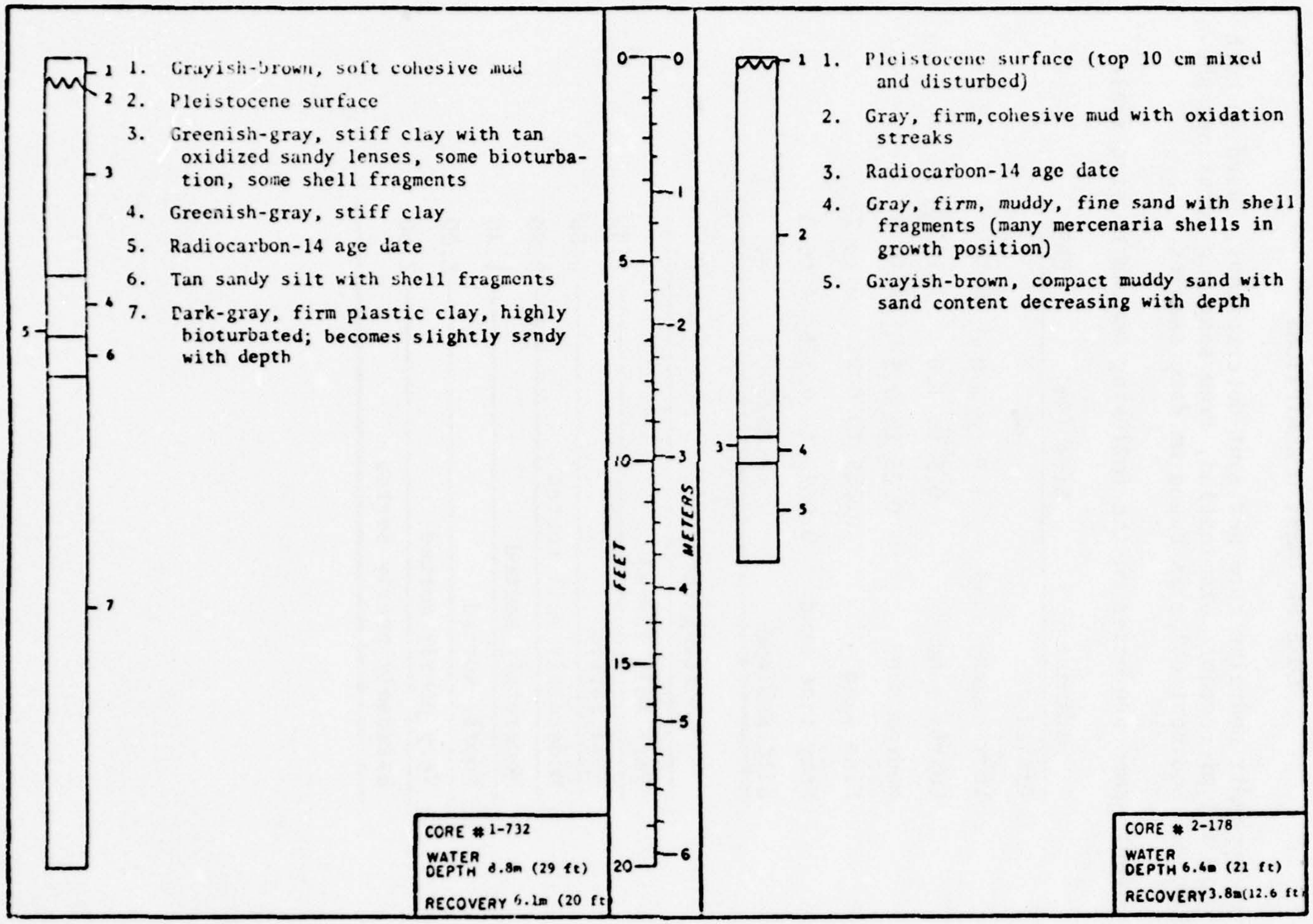
CORE SEDIMENT DESCRIPTIONS

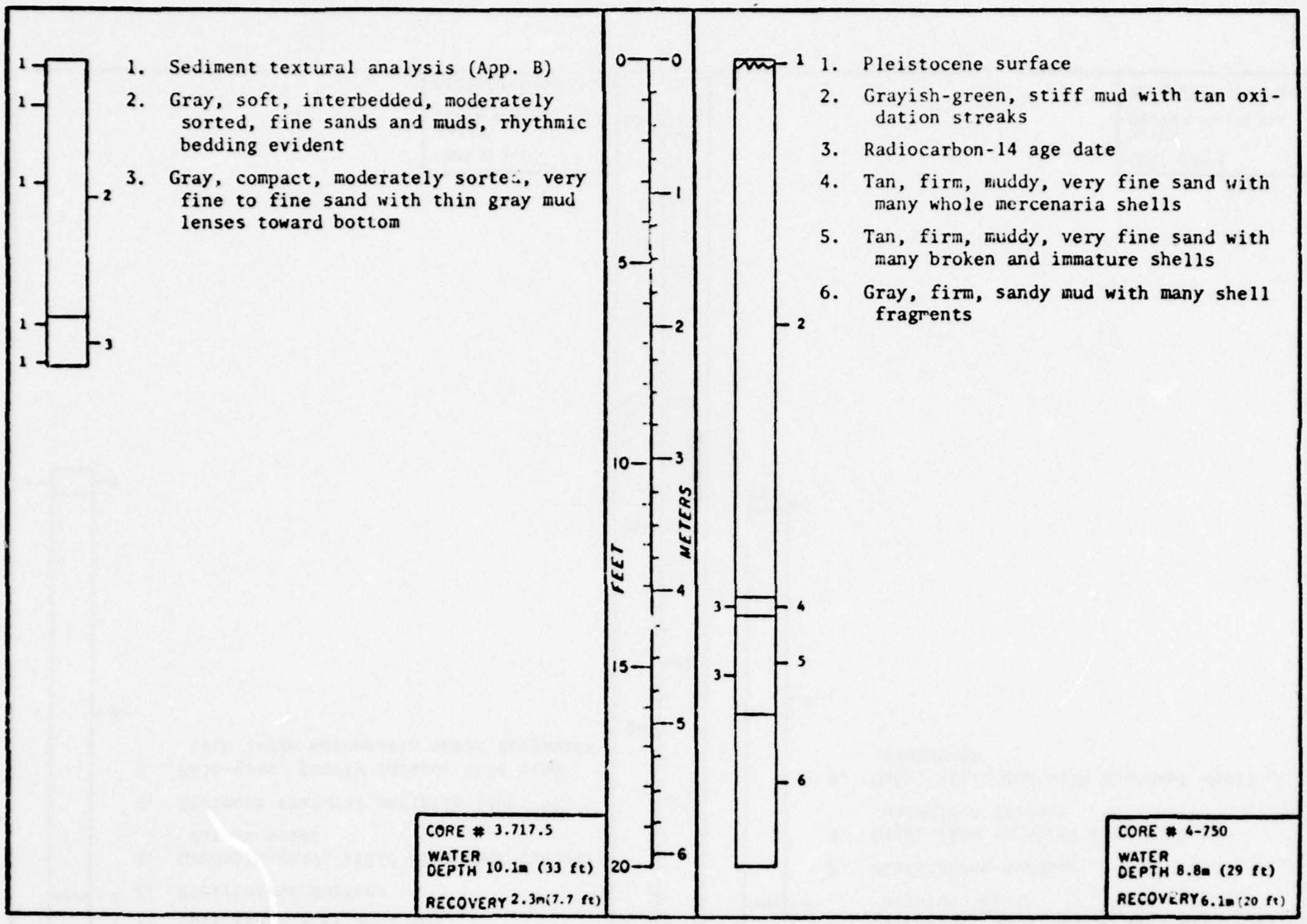
This appendix contains core sediment descriptions, based on both megascopic and microscopic examination, from sampling locations shown in Figure 8. Sediment color is based on damp samples.

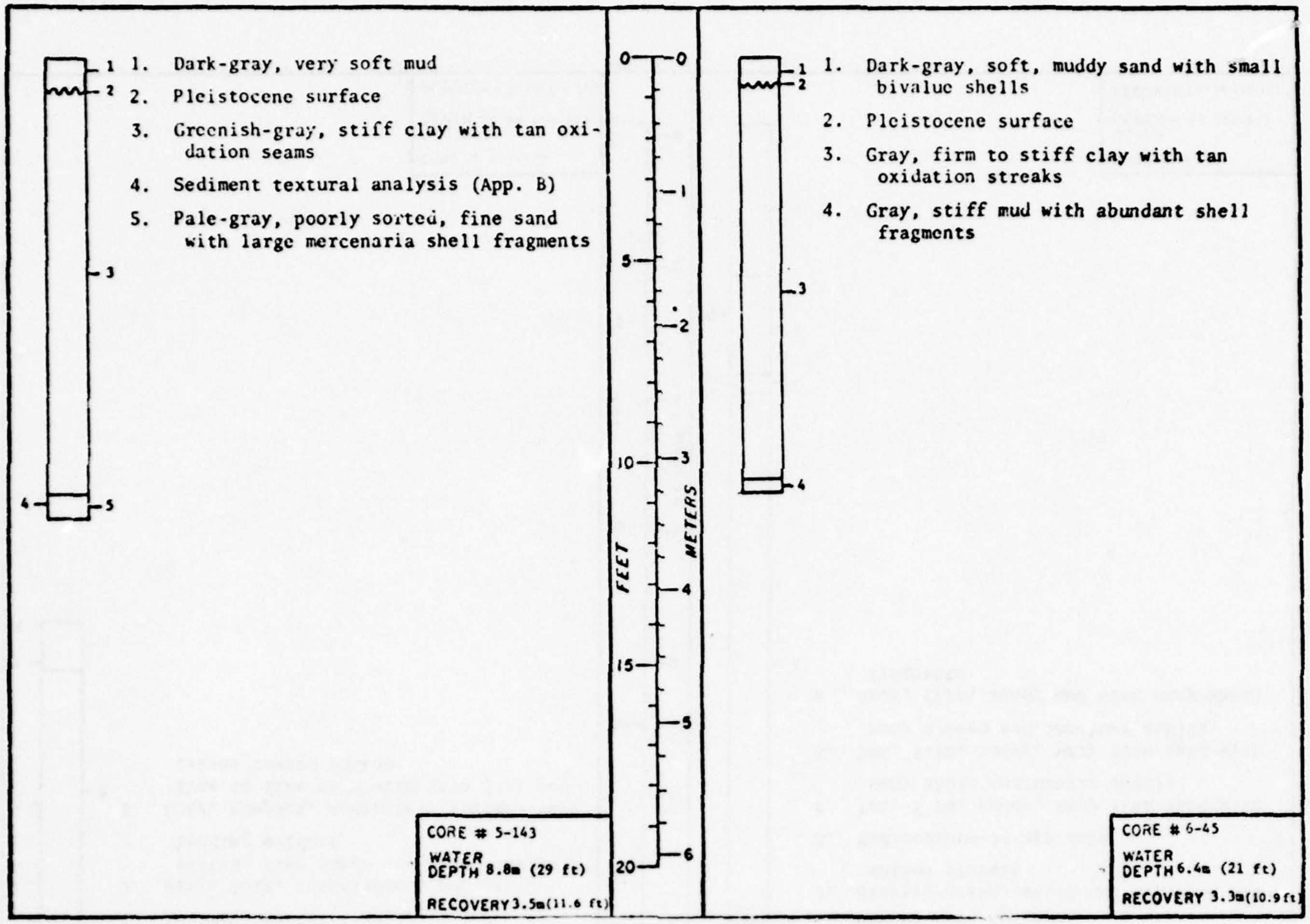
Sediment names are based on the following Wentworth size scale:

Sediment	Size (mm)	Phi
Gravel	>2	<-1
Very coarse sand	1.0 to 2.0	0 to -1
Coarse sand	0.5 to 1.0	1 to 0-
Medium sand	0.25 to 0.5	2 to 1-
Fine sand	0.125 to 0.25	3 to 2-
Very fine sand	0.0625 to 0.125	4 to 3-
Silt and mud	<0.0625	>4

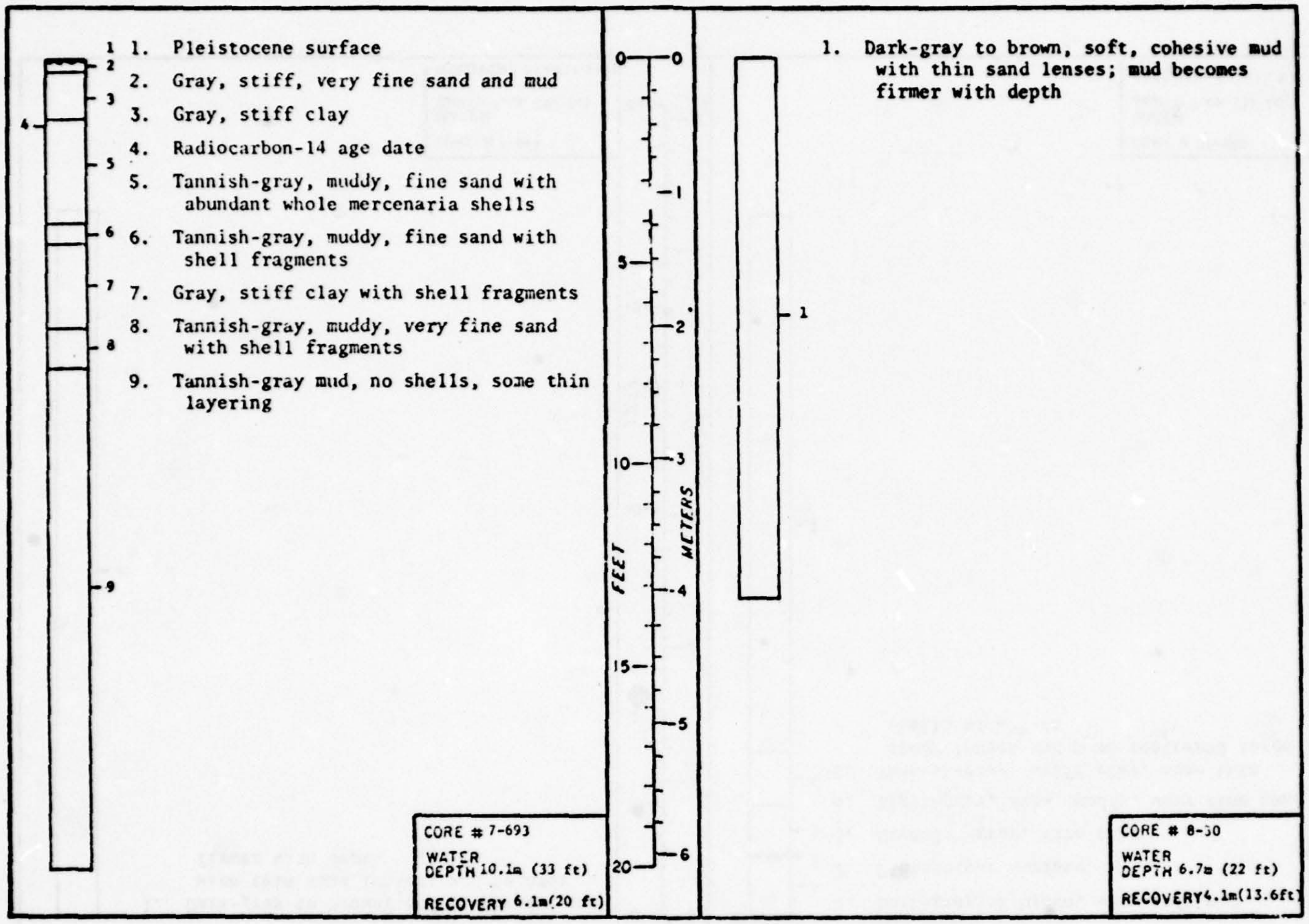
Sorting terms	
Very well sorted	
	0.35
Well sorted	
	0.50
Moderately well sorted	
	0.80
Moderately sorted	
	1.40
Poorly sorted	
	2.00
Very poorly sorted	
	2.60
Extremely poorly sorted	

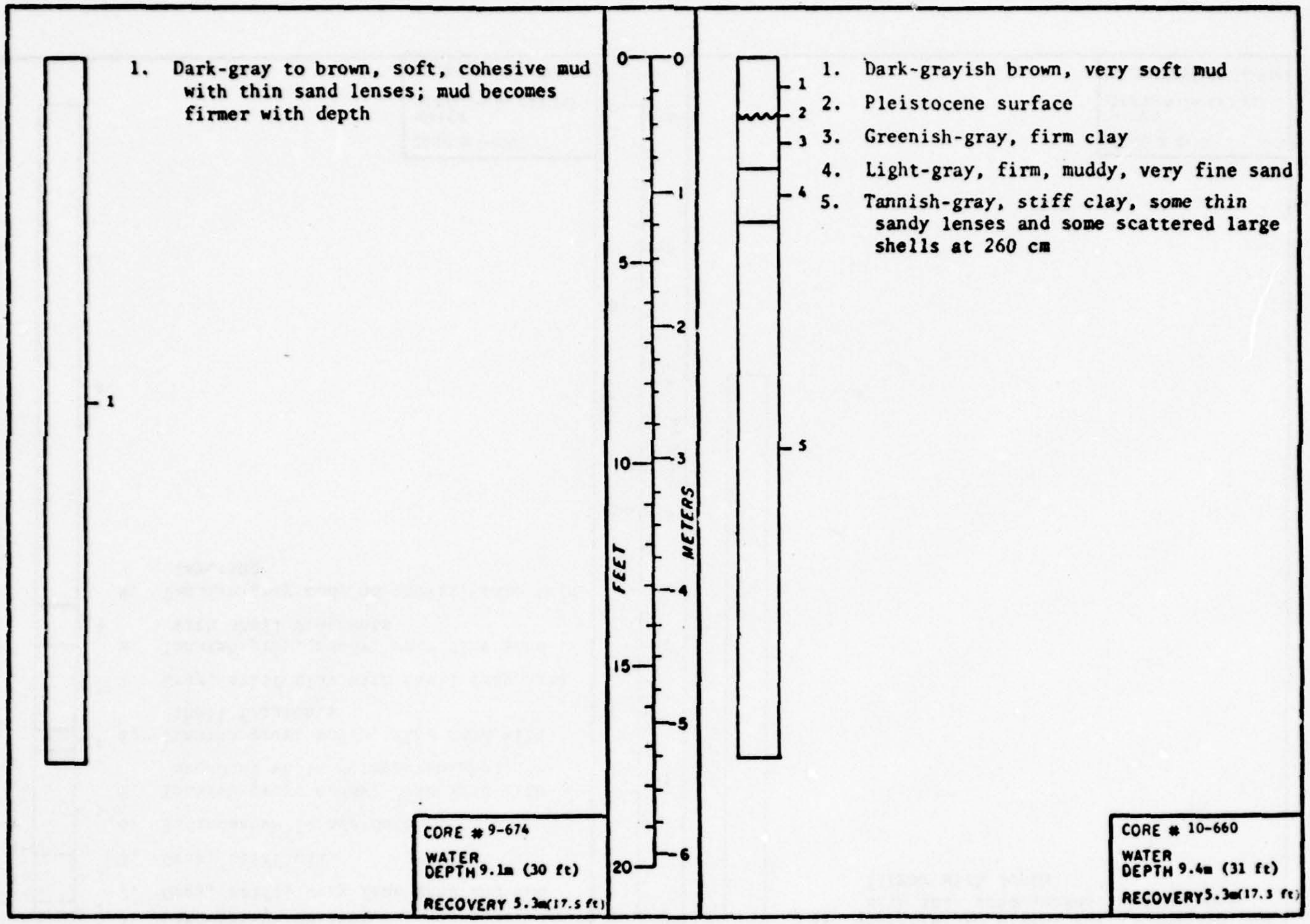

1. Grayish-brown, soft cohesive mud
2. Pleistocene surface
3. Greenish-gray, stiff clay with tan oxidized sandy lenses, some bioturbation, some shell fragments
4. Greenish-gray, stiff clay
5. Radiocarbon-14 age date
6. Tan sandy silt with shell fragments
7. Dark-gray, firm plastic clay, highly bioturbated; becomes slightly sandy with depth
CORE # 1-732
WATER DEPTH 8.8m (29 ft)
RECOVERY 6.1m (20 ft)
FEET
METERS
1. Pleistocene surface (top 10 cm mixed and disturbed)
2. Gray, firm, cohesive mud with oxidation streaks
3. Radiocarbon-14 age date
4. Gray, firm, muddy, fine sand with shell fragments (many mercenaria shells in growth position)
5. Grayish-brown, compact muddy sand with sand content decreasing with depth
CORE # 2-178
WATER DEPTH 6.4m (21 ft)
RECOVERY 3.8m (12.6 ft)


1. Sediment textural analysis (App. B)
2. Gray, soft, interbedded, moderately sorted, fine sands and muds, rhythmic bedding evident
3. Gray, compact, moderately sorted, very fine to fine sand with thin gray mud lenses toward bottom
CORE # 3.717.5
WATER DEPTH 10.1m (33 ft)
RECOVERY 2.3m(7.7 ft)
FEET
METERS
1. Pleistocene surface
2. Grayish-green, stiff mud with tan oxidation streaks
3. Radiocarbon-14 age date
4. Tan, firm, muddy, very fine sand with many whole mercenaria shells
5. Tan, firm, muddy, very fine sand with many broken and immature shells
6. Gray, firm, sandy mud with many shell fragments
CORE # 4-750
WATER DEPTH 8.8m (29 ft)
RECOVERY 6.1m (20 ft)



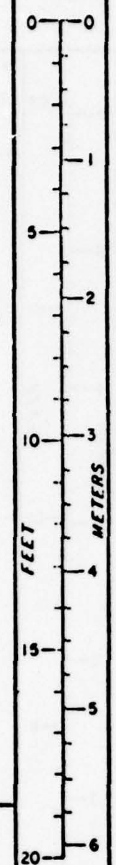
1. Dark-gray, very soft mud
2. Pleistocene surface
3. Greenish-gray, stiff clay with tan oxidation seams
4. Sediment textural analysis (App. B)
5. Pale-gray, poorly sorted, fine sand with large mercenaria shell fragments
CORE # 5-143
WATER DEPTH 8.8m (29 ft)
RECOVERY 3.5m (11.6 ft)
FEET
METERS
0
5
10
15
20
0
1
2
3
4
5
6
1. Dark-gray, soft, muddy sand with small bivalue shells
2. Pleistocene surface
3. Gray, firm to stiff clay with tan oxidation streaks
4. Gray, stiff mud with abundant shell fragments
CORE # 6-45
WATER DEPTH 6.4m (21 ft)
RECOVERY 3.3m (10.9 ft)

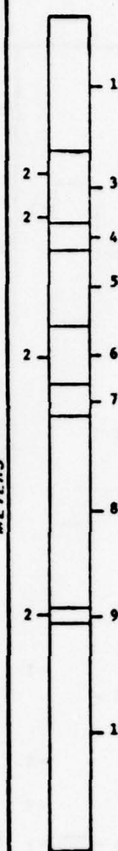

1. Pleistocene surface
2. Gray, stiff, very fine sand and mud
3. Gray, stiff clay
4. Radiocarbon-14 age date
5. Tannish-gray, muddy, fine sand with abundant whole mercenaria shells
6. Tannish-gray, muddy, fine sand with shell fragments
7. Gray, stiff clay with shell fragments
8. Tannish-gray, muddy, very fine sand with shell fragments
9. Tannish-gray mud, no shells, some thin layering
CORE # 7-693
WATER DEPTH 10.1m (33 ft)
RECOVERY 6.1m (20 ft)
FEET
METERS
0
5
10
15
20
1
2
3
4
5
6
1. Dark-gray to brown, soft, cohesive mud with thin sand lenses; mud becomes firmer with depth
CORE # 8-30
WATER DEPTH 6.7m (22 ft)
RECOVERY 4.1m (13.6ft)


1. Dark-gray to brown, soft, cohesive mud with thin sand lenses; mud becomes firmer with depth
FEET
METERS
CORE # 9-674
WATER DEPTH 9.1m (30 ft)
RECOVERY 5.3m(17.5 ft)
1. Dark-grayish brown, very soft mud
2. Pleistocene surface
3. Greenish-gray, firm clay
4. Light-gray, firm, muddy, very fine sand
5. Tannish-gray, stiff clay, some thin sandy lenses and some scattered large shells at 260 cm
CORE # 10-660
WATER DEPTH 9.4m (31 ft)
RECOVERY 5.3m(17.3 ft)

1. Grayish-brown, very soft mud
2. Sediment textural analysis (App. B)
3. Gray, tight, moderately well sorted, fine sand
4. Pleistocene surface
5. Light-gray, firm clay with oxidation streaks
6. Reddish-brown, oxidized, fine sand
7. Light-gray clay
8. Gray, fine to medium, well-sorted sand
9. Tannish-gray firm clay
10. Dark-gray, firm clay
11. Gray, firm clay

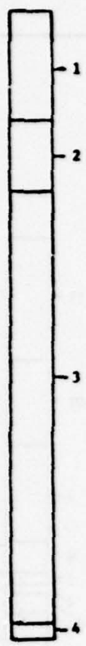
CORE # 11-07
WATER DEPTH 8.5m (28 ft)
RECOVERY 5m (16.5 ft)





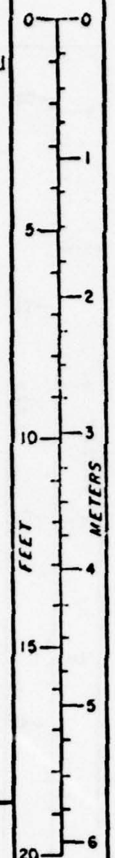
1. Grayish-brown, very soft mud
2. Sediment textural analysis
3. Dark-gray, muddy, fine to medium sand with shell fragments; becomes more sandy from 134 to 150 cm
4. Dark-gray mud; becomes more sandy 167 to 175 cm
5. Dark-gray, sandy mud; many shell fragments 207 to 227 cm
6. Gray, well sorted, fine sand
7. Gray, muddy, fine sand with large shell fragments and calcareous nodule (4-cm diameter)
8. Gray, soft clay
9. Gray, moderately well sorted, fine sand
10. Gray, soft clay

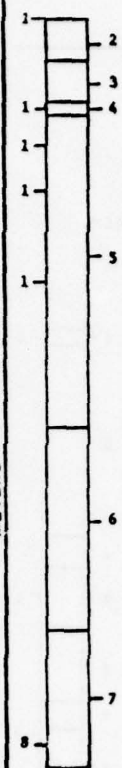
CORE # 12-91
WATER DEPTH 7.0m (23 ft)
RECOVERY 6.1m (20 ft)



1. Grayish-brown, very soft mud
2. Grayish-brown, very soft, sandy mud and muddy sand
3. Gray, soft mud, becomes stiffer with depth
4. 8-cm layer of black organic material at bottom

CORE # 13-645
WATER DEPTH 11.9m (39 ft)
RECOVERY 4.6m (15.2 ft)



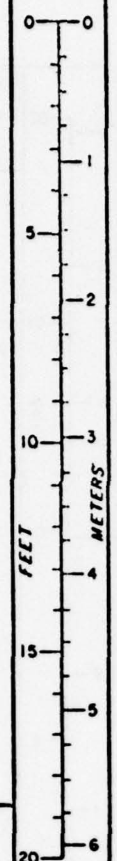


1. Sediment textural analysis (App. B)
2. Dark-gray, slightly muddy, loose, fine sand
3. Dark-gray sandy mud
4. Gray, well-sorted, fine sand
5. Alternating layers of grayish-brown, soft, muddy, very fine to fine sand and sandy muds
6. Brown, soft, cohesive clay with muddy sands at 415 to 418 cm, muddy sands with shell fragments at 439 to 444 cm and 448 to 452 cm
7. Brown, soft mud and sandy mud, shell fragments at 472 to 474 cm, shell fragments and rounded pebbles ($\leq$ 3-cm diameter) at 526 to 549 cm
8. Radiocarbon-14 age date

CORE # 14-624
WATER DEPTH 9.8m (32 ft)
RECOVERY 5.5m (18 ft)

1. Brown, very soft mud
2. Sediment textural analysis (App. B)
3. Brown, soft, muddy, fine sand
4. Grayish-brown, soft mud
5. Dark-gray sandy mud with 1- to 2-cm layers of muddy sand
6. Gray, very fine to fine sand

CORE # 15-871
WATER DEPTH 7.6m (25 ft)
RECOVERY 2.6m (8.6 ft)

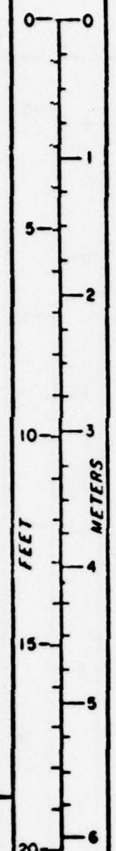


1. Brown, very soft mud with thin muddy sand layers; gray, moderately sorted, fine sand (52 to 57 cm)
2. Sediment textural analysis (App. B)
3. Brown, soft mud with thin, muddy sand layers
4. Dark-gray, muddy, fine sand with abundant shell fragments at 153 to 159 cm
5. Dark-gray, sandy mud with thin layers of muddy sand
6. Dark-gray, soft, cohesive clay

CORE # 16-614
WATER DEPTH 9.8m (32 ft)
RECOVERY 4.3m (14.1 ft)

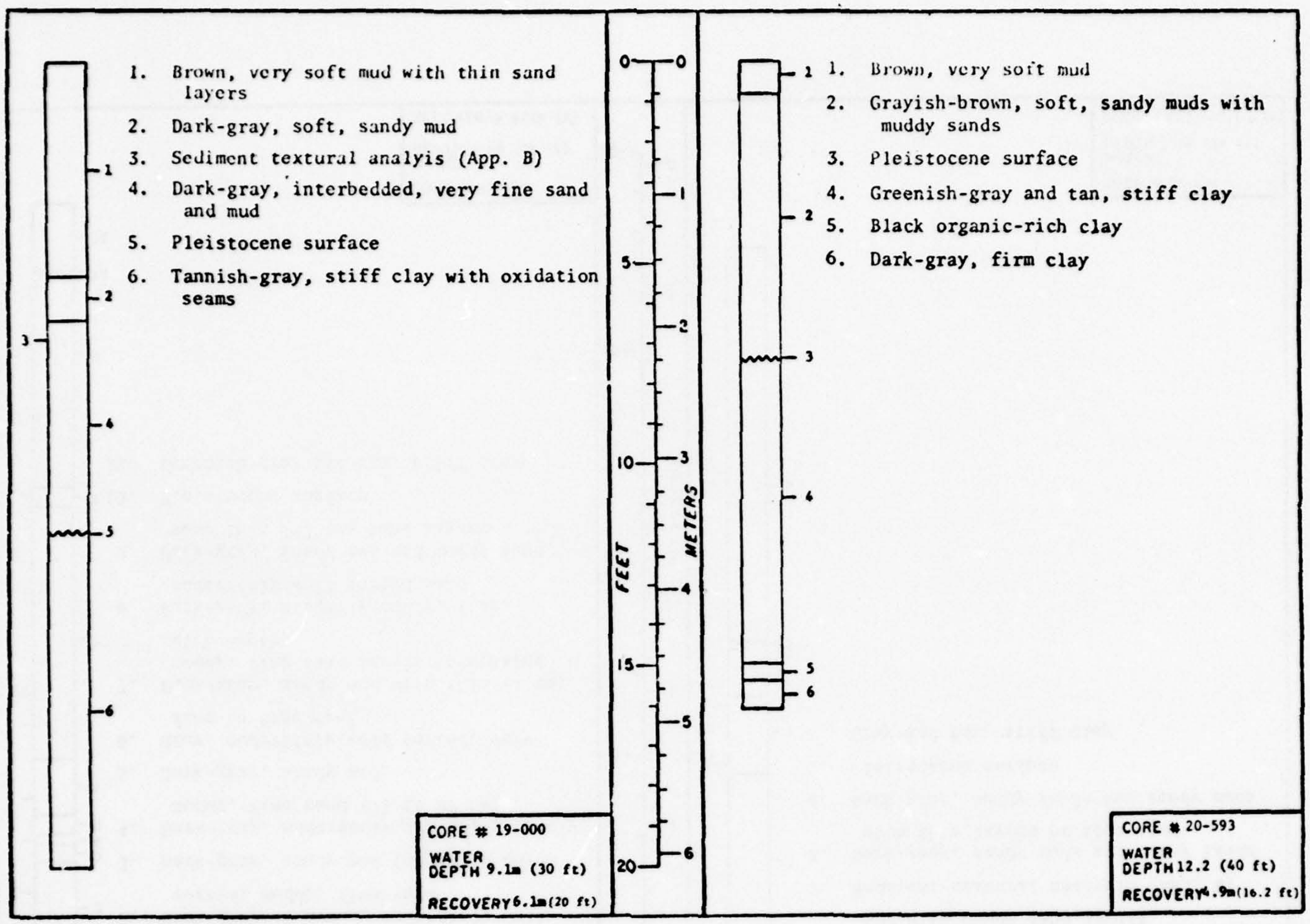
1. Grayish-brown, soft mud on top grading to muddy sands; gray, moderately well sorted, fine sand at 70 to 100 cm
2. Sediment textural analysis (App. B)
3. Dark-gray, moderately sorted, fine sand
4. Dark-gray, soft, cohesive clay
5. Dark-gray, moderately well sorted, fine sand
6. Dark-gray, soft mud with sandfilled burrow holes
7. Gray, moderately well sorted, fine sand
8. Gray muddy sand
9. Gray, well-sorted, fine sand
10. *Gray, soft mud*
11. Gray, moderately well sorted, fine sand (321 to 326 cm); gray, sandy mud with thin sand layers
12. Gray, well-sorted, fine sand (350 to 358 cm); gray, sandy mud with thin sand layers
13. Gray, well-sorted, fine sand (388 to 392 cm); gray sandy mud
14. Gray, slightly sandy, soft, cohesive mud
15. Gray, slightly muddy, fine sand, mud content decreases with depth
16. Dark-gray, soft, sandy mud
17. Gray, moderately well sorted, fine sand

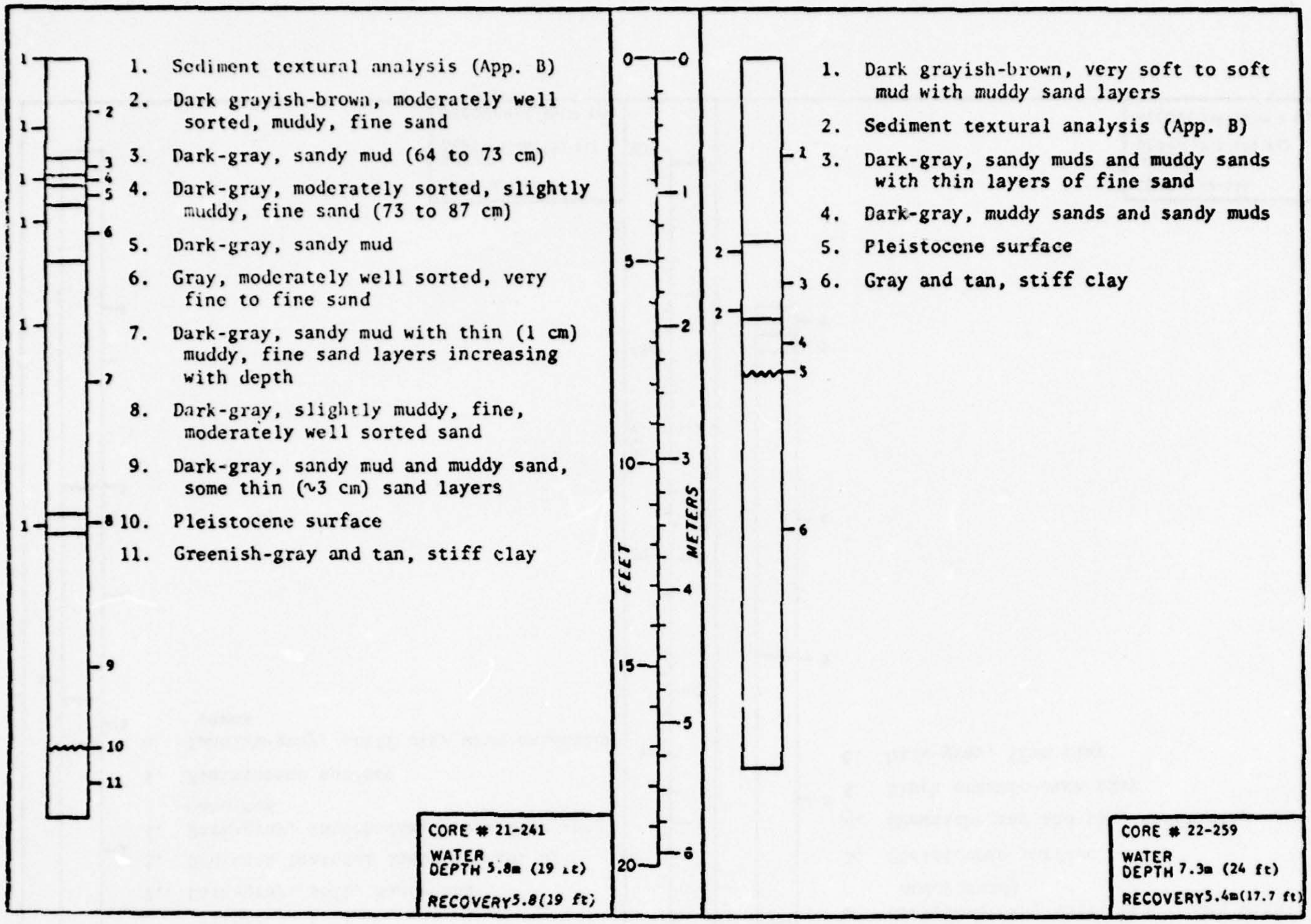
CORE # 17-207
WATER DEPTH 6.1m (20 ft)
RECOVERY 6.1m (20 ft)

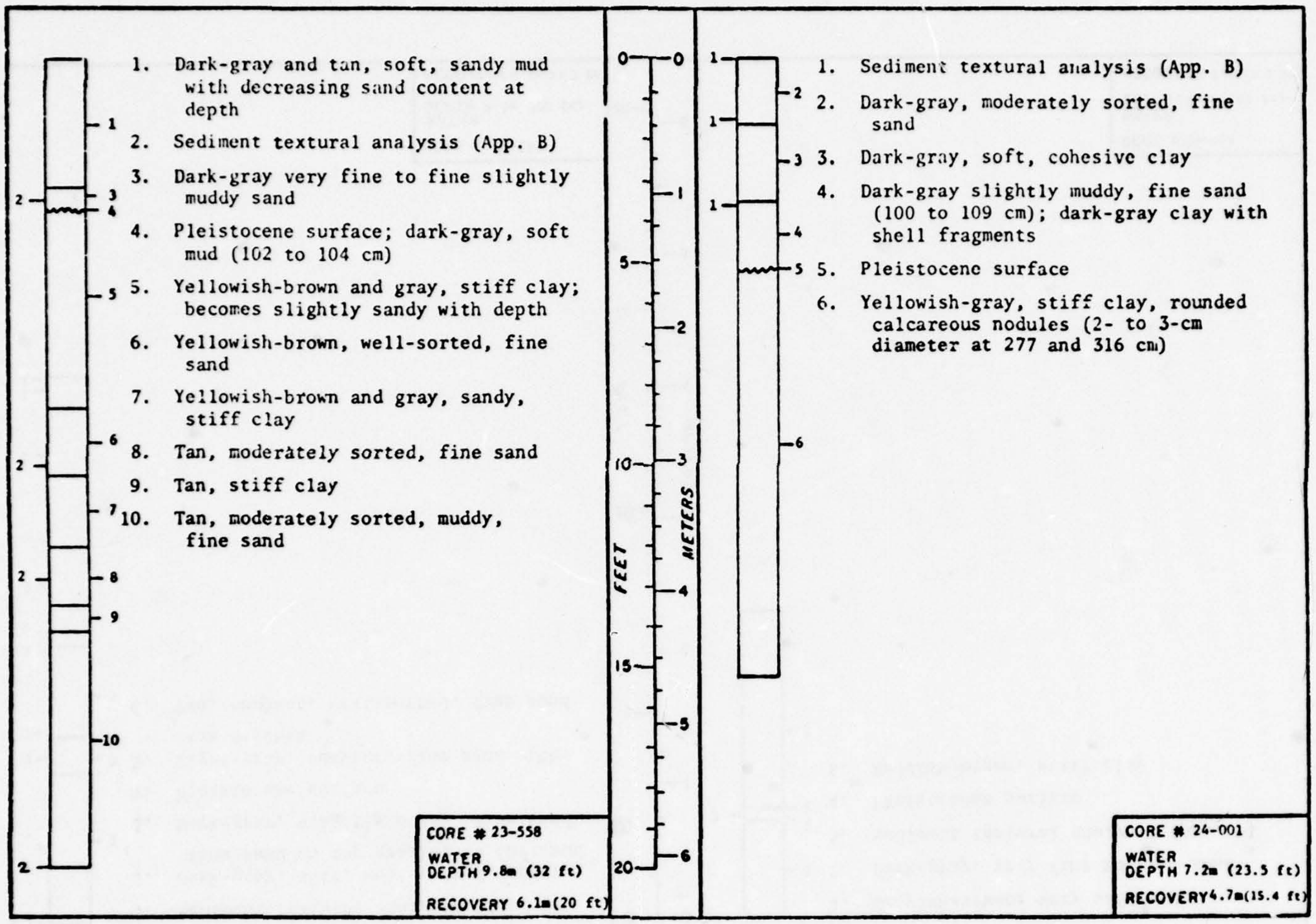


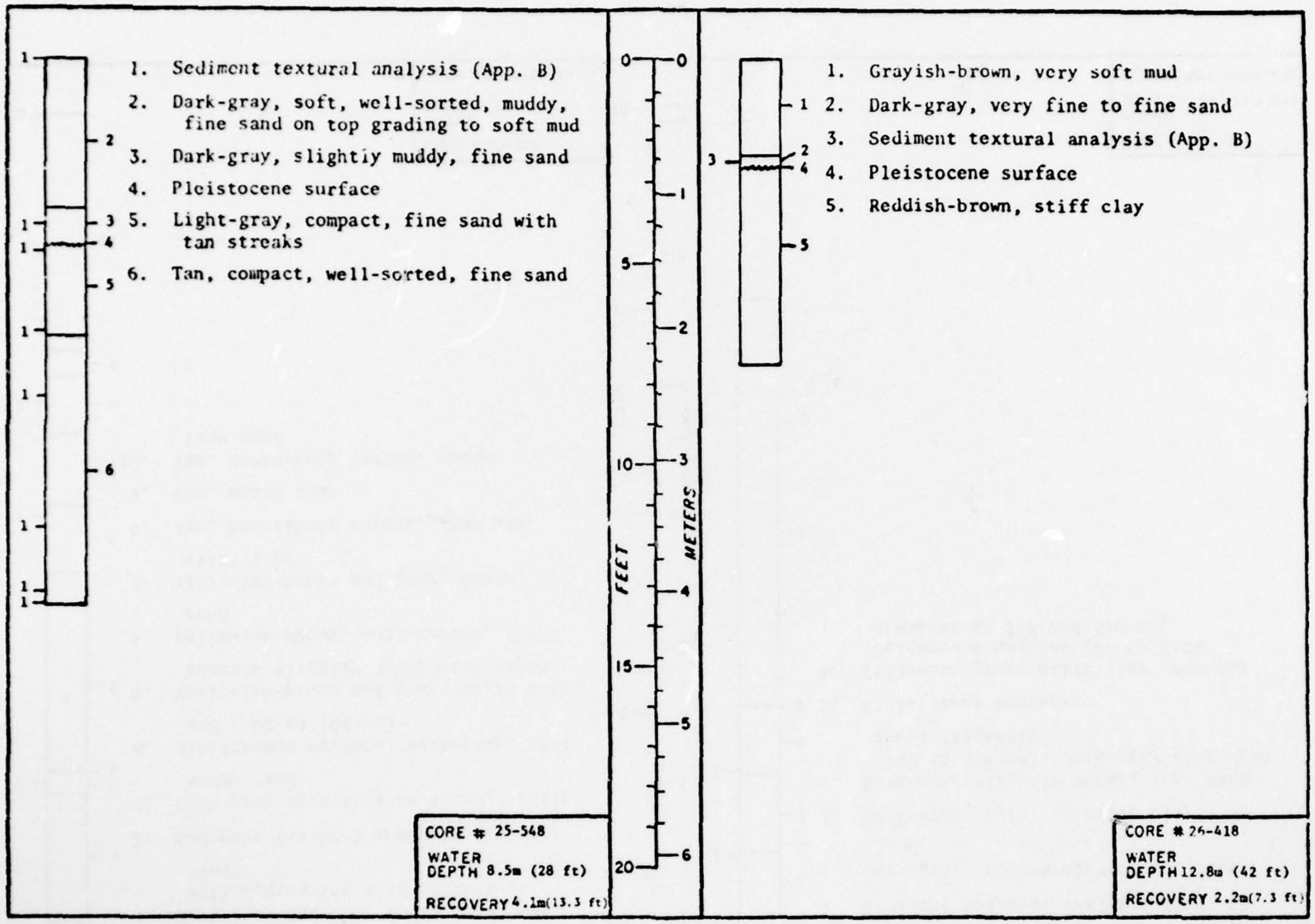
1. Sediment textural analysis
2. Gray, moderately well sorted, fine sand
3. Gray, soft, sandy mud
4. Gray, moderately sorted, fine sand; gray, sandy mud at 135 to 145 cm
5. Gray, muddy, sandy shell hash
6. Gray, interbedded mud and sand
7. Gray, well-sorted, fine sand; mud at 245 to 250 cm
8. Gray, interbedded mud and sand
9. Gray, moderately well sorted, fine sand
10. *Gray, interbedded mud and very fine sand*
11. Gray, very fine to fine, moderately sorted sand
12. Gray, muddy sand and sandy mud with thin sand lenses

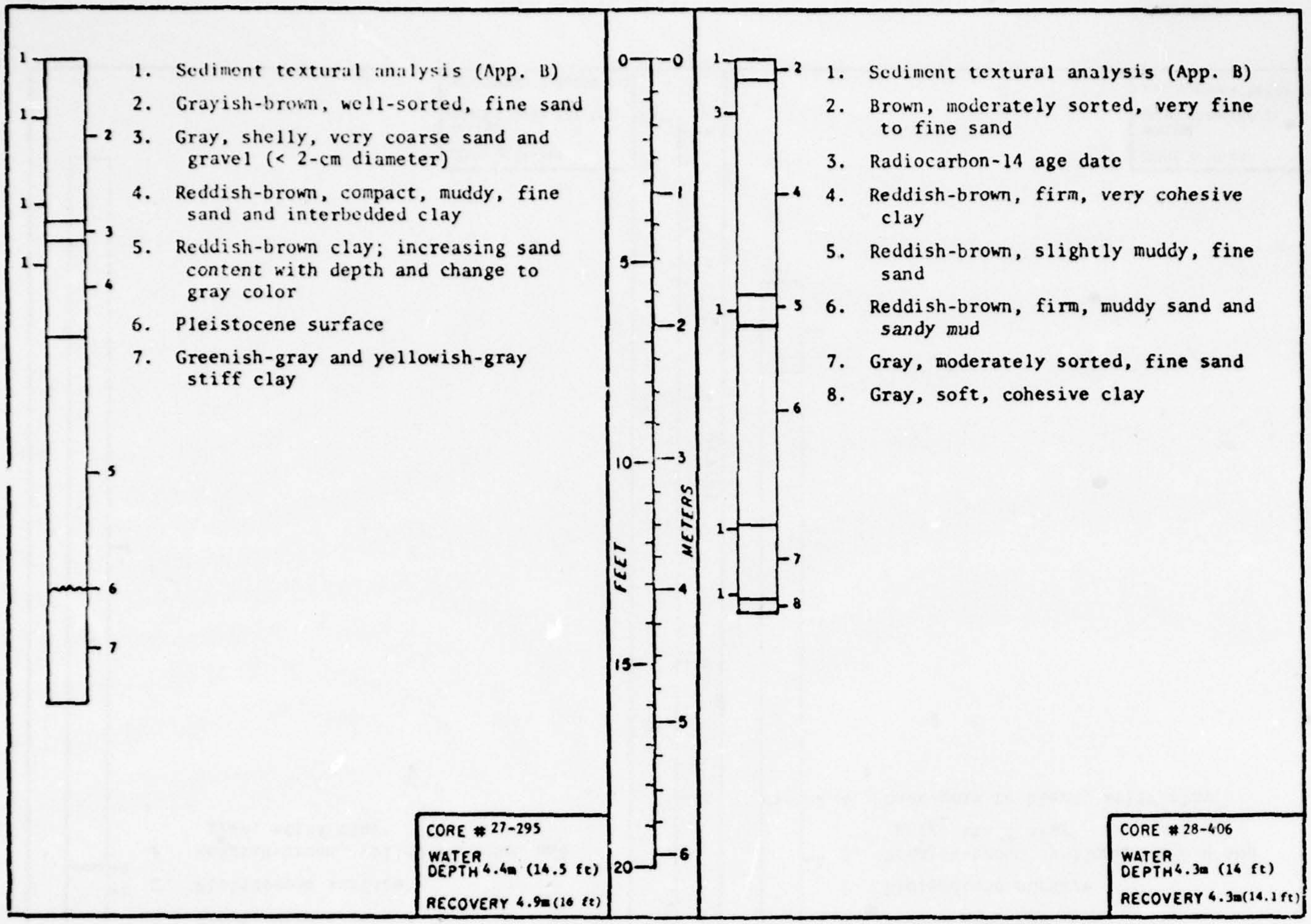
CORE # 18-209
WATER DEPTH 6.1m (20 ft)
RECOVERY 5.8m (19 ft)


1. Brown, very soft mud with thin sand layers
2. Dark-gray, soft, sandy mud
3. Sediment textural analyis (App. B)
4. Dark-gray, interbedded, very fine sand and mud
5. Pleistocene surface
6. Tannish-gray, stiff clay with oxidation seams
CORE # 19-000
WATER DEPTH 9.1m (30 ft)
RECOVERY 6.1m (20 ft)
FEET
0
5
10
15
20
METERS
0
1
2
3
4
5
6
1. Brown, very soft mud
2. Grayish-brown, soft, sandy muds with muddy sands
3. Pleistocene surface
4. Greenish-gray and tan, stiff clay
5. Black organic-rich clay
6. Dark-gray, firm clay
CORE # 20-593
WATER DEPTH 12.2 (40 ft)
RECOVERY 4.9m (16.2 ft)

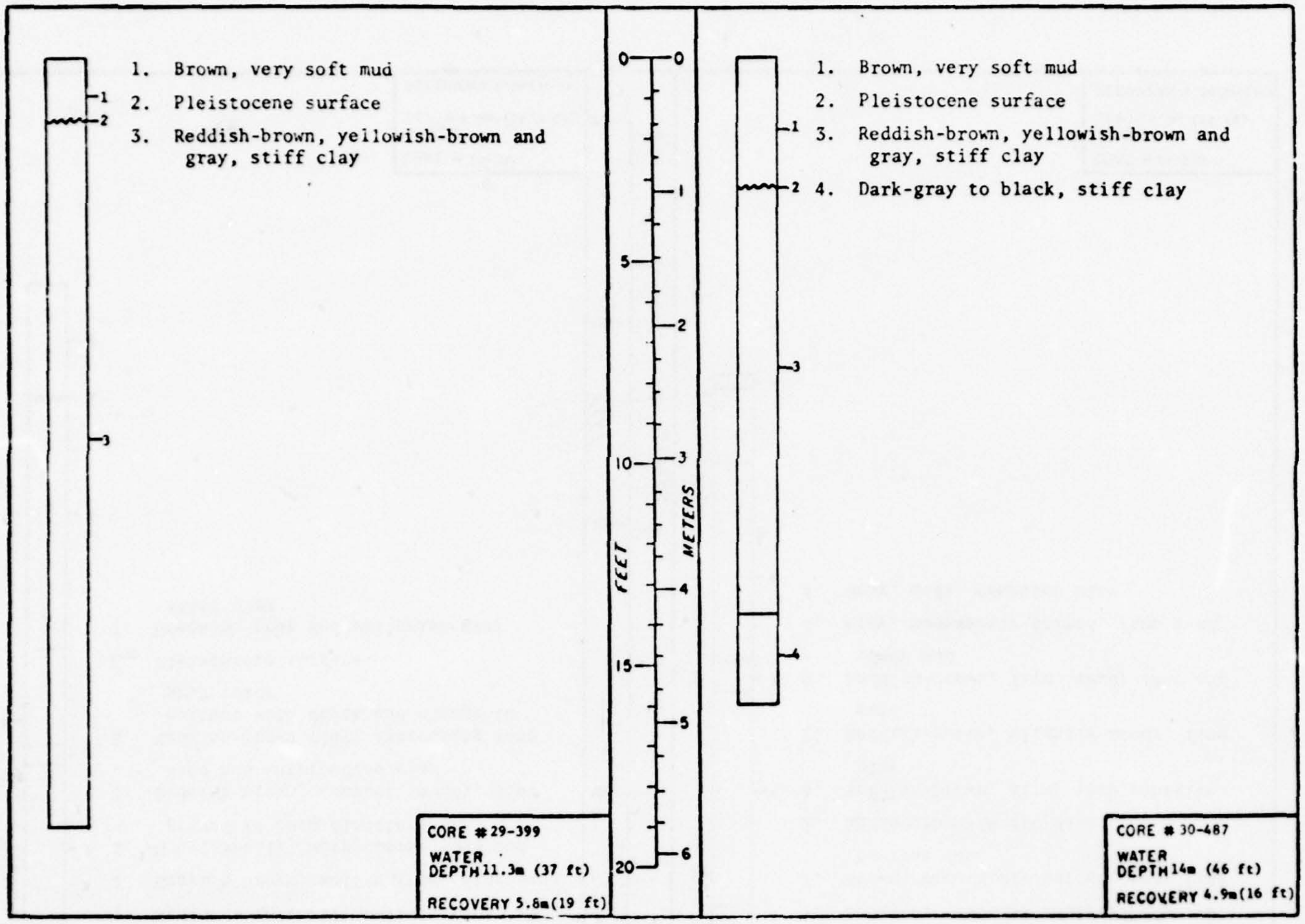

1. Sediment textural analysis (App. B)
2. Dark grayish-brown, moderately well sorted, muddy, fine sand
3. Dark-gray, sandy mud (64 to 73 cm)
4. Dark-gray, moderately sorted, slightly muddy, fine sand (73 to 87 cm)
5. Dark-gray, sandy mud
6. Gray, moderately well sorted, very fine to fine sand
7. Dark-gray, sandy mud with thin (1 cm) muddy, fine sand layers increasing with depth
8. Dark-gray, slightly muddy, fine, moderately well sorted sand
9. Dark-gray, sandy mud and muddy sand, some thin (~3 cm) sand layers
10. Pleistocene surface
11. Greenish-gray and tan, stiff clay
CORE # 21-241
WATER DEPTH 5.8m (19 ft)
RECOVERY 5.8 (19 ft)
FEET
METERS
1. Dark grayish-brown, very soft to soft mud with muddy sand layers
2. Sediment textural analysis (App. B)
3. Dark-gray, sandy muds and muddy sands with thin layers of fine sand
4. Dark-gray, muddy sands and sandy muds
5. Pleistocene surface
6. Gray and tan, stiff clay
CORE # 22-259
WATER DEPTH 7.3m (24 ft)
RECOVERY 5.4m (17.7 ft)

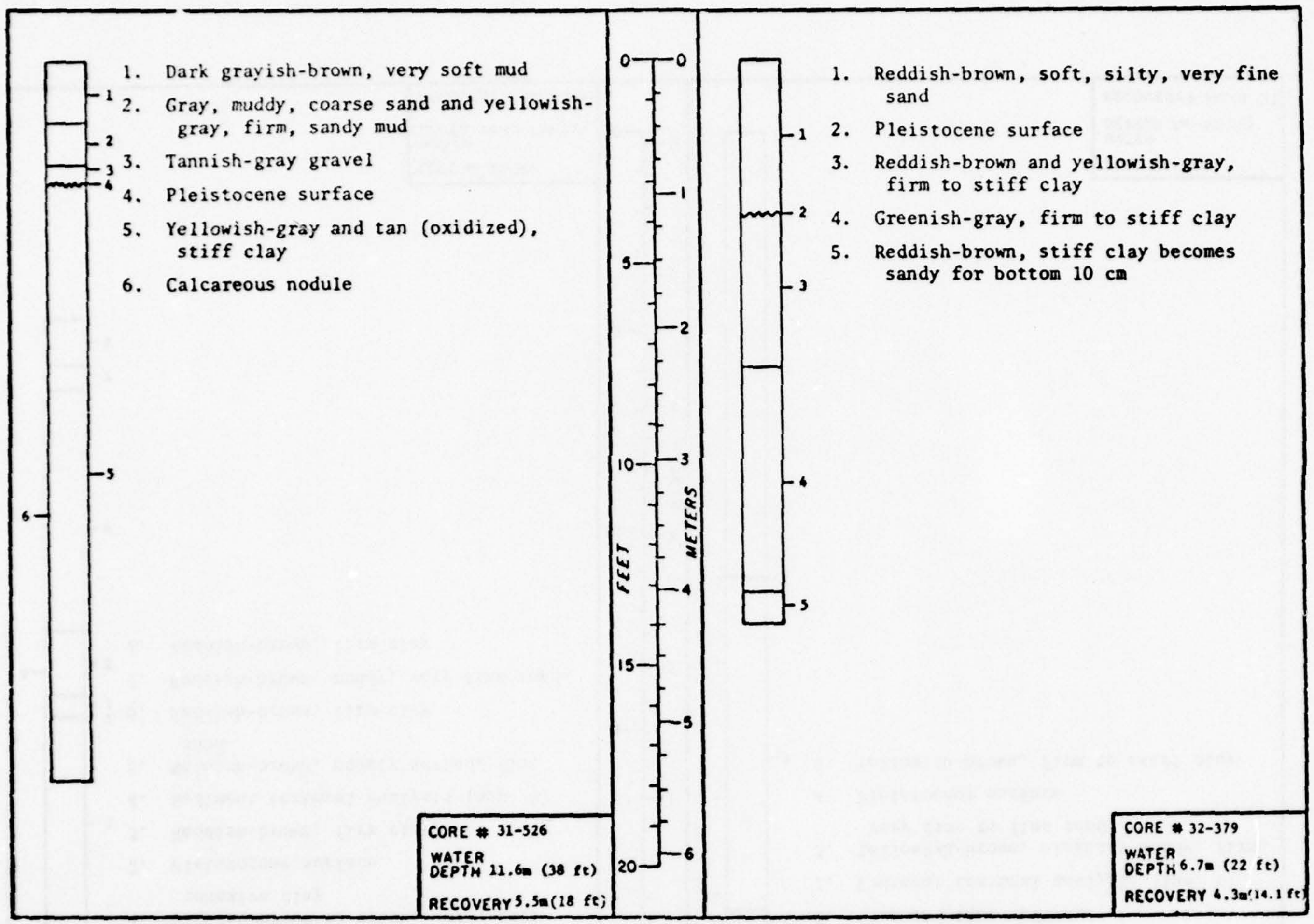

1. Dark-gray and tan, soft, sandy mud with decreasing sand content at depth
2. Sediment textural analysis (App. B)
3. Dark-gray very fine to fine slightly muddy sand
4. Pleistocene surface; dark-gray, soft mud (102 to 104 cm)
5. Yellowish-brown and gray, stiff clay; becomes slightly sandy with depth
6. Yellowish-brown, well-sorted, fine sand
7. Yellowish-brown and gray, sandy, stiff clay
8. Tan, moderately sorted, fine sand
9. Tan, stiff clay
10. Tan, moderately sorted, muddy, fine sand
CORE # 23-558
WATER DEPTH 9.8m (32 ft)
RECOVERY 6.1m (20 ft)
FEET
METERS
1. Sediment textural analysis (App. B)
2. Dark-gray, moderately sorted, fine sand
3. Dark-gray, soft, cohesive clay
4. Dark-gray slightly muddy, fine sand (100 to 109 cm); dark-gray clay with shell fragments
5. Pleistocene surface
6. Yellowish-gray, stiff clay, rounded calcareous nodules (2- to 3-cm diameter at 277 and 316 cm)
CORE # 24-001
WATER DEPTH 7.2m (23.5 ft)
RECOVERY 4.7m (15.4 ft)


1. Sediment textural analysis (App. B)
2. Dark-gray, soft, well-sorted, muddy, fine sand on top grading to soft mud
3. Dark-gray, slightly muddy, fine sand
4. Pleistocene surface
5. Light-gray, compact, fine sand with tan streaks
6. Tan, compact, well-sorted, fine sand
CORE # 25-548
WATER DEPTH 8.5m (28 ft)
RECOVERY 4.1m(13.3 ft)
FEET
METERS
0
5
10
15
20
1
2
3
4
6
1. Grayish-brown, very soft mud
2. Dark-gray, very fine to fine sand
3. Sediment textural analysis (App. B)
4. Pleistocene surface
5. Reddish-brown, stiff clay
CORE # 26-418
WATER DEPTH 12.8m (42 ft)
RECOVERY 2.2m(7.3 ft)



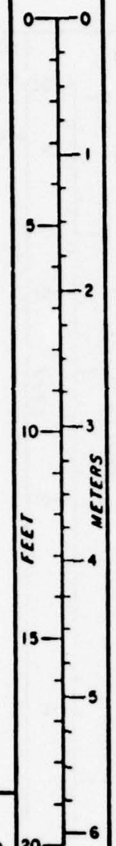
1. Sediment textural analysis (App. B)
2. Grayish-brown, well-sorted, fine sand
3. Gray, shelly, very coarse sand and gravel (< 2-cm diameter)
4. Reddish-brown, compact, muddy, fine sand and interbedded clay
5. Reddish-brown clay; increasing sand content with depth and change to gray color
6. Pleistocene surface
7. Greenish-gray and yellowish-gray stiff clay
CORE # 27-295
WATER DEPTH 4.4m (14.5 ft)
RECOVERY 4.9m (16 ft)
FEET
0
5
10
15
20
METERS
0
1
2
3
4
5
6
1. Sediment textural analysis (App. B)
2. Brown, moderately sorted, very fine to fine sand
3. Radiocarbon-14 age date
4. Reddish-brown, firm, very cohesive clay
5. Reddish-brown, slightly muddy, fine sand
6. Reddish-brown, firm, muddy sand and *sandy mud*
7. Gray, moderately sorted, fine sand
8. Gray, soft, cohesive clay
CORE # 28-406
WATER DEPTH 4.3m (14 ft)
RECOVERY 4.3m (14.1 ft)

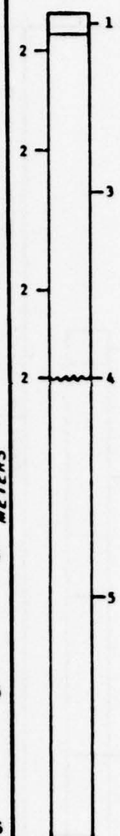

1. Brown, very soft mud
2. Pleistocene surface
3. Reddish-brown, yellowish-brown and gray, stiff clay
CORE # 29-399
WATER DEPTH 11.3m (37 ft)
RECOVERY 5.8m (19 ft)
FEET
0
5
10
15
20
METERS
0
1
2
3
4
5
6
1. Brown, very soft mud
2. Pleistocene surface
3. Reddish-brown, yellowish-brown and gray, stiff clay
4. Dark-gray to black, stiff clay
CORE # 30-487
WATER DEPTH 14m (46 ft)
RECOVERY 4.9m (16 ft)


1. Dark grayish-brown, very soft mud
2. Gray, muddy, coarse sand and yellowish-gray, firm, sandy mud
3. Tannish-gray gravel
4. Pleistocene surface
5. Yellowish-gray and tan (oxidized), stiff clay
6. Calcareous nodule
CORE # 31-526
WATER DEPTH 11.6m (38 ft)
RECOVERY 5.5m (18 ft)
FEET
METERS
0
5
10
15
20
0
1
2
3
4
5
6
1. Reddish-brown, soft, silty, very fine sand
2. Pleistocene surface
3. Reddish-brown and yellowish-gray, firm to stiff clay
4. Greenish-gray, firm to stiff clay
5. Reddish-brown, stiff clay becomes sandy for bottom 10 cm
CORE # 32-379
WATER DEPTH 6.7m (22 ft)
RECOVERY 4.3m (14.1 ft)

1. Grayish-brown to brown, soft, very cohesive clay
2. Pleistocene surface
3. Reddish-brown, firm clay
4. Sediment textural analysis (App. B)
5. Reddish-brown, poorly sorted, fine sand
6. Reddish-brown, firm clay
7. Reddish-brown, muddy, very fine sand
8. Reddish-brown, firm clay

CORE # 33-370
WATER DEPTH 10.4m (34 ft)
RECOVERY 4.8m(15.6ft)





1. Gray and tan, soft mud
2. Sediment textural analysis (App. B)
3. Yellowish-brown, slightly muddy, firm, very fine to fine sand
4. Pleistocene surface
5. Yellowish-brown, firm to stiff clay

CORE #34-332
WATER DEPTH6.7m (22 ft)
RECOVERY 6.1m(20 ft)

APPENDIX B

GRANULOMETRIC DATA AND CUMULATIVE CURVE PLOTS

This appendix contains the results of Rapid Sand Analyzer (RSA) size analyses of selected sediment samples from 15 cores in the study area shown in Figure 8. Also included are sieve data from one sample too coarse to process by RSA. Analyses are based on sand-size fractions only.

The samples are identified by core number and sample interval below the top of the core. Specific locations of the samples from each core are shown in Appendix A.

Data include the frequency percent at 0.5-phi intervals along with the cumulative percent which indicates the percentages of sand grains coarser than the size shown. Also included are the median, mean, standard deviation (sorting), skewness, and kurtosis for each sample.

Experience has shown that grain-size values from RSA analyses are consistent and slightly coarser than results of dry sieve analyses of identical samples. To relate these RSA data to other sieve data, empirical relations for converting RSA means and standard deviation to sieve analyses equivalents have been determined. The relationships, developed from RSA and sieve analyses at a 0.25-phi interval, are:

$$\text{mean:}\quad \bar{X}_{\phi \text{sieve}} = 1.0735\ \bar{X}_{\phi \text{RSA}} + 0.1876$$

RSA standard deviation values may be converted to sieve sorting equivalents by the formula:

$$\text{standard deviation:}\quad \sigma_{\phi}\ \text{sieve} = 1.4535\ \sigma_{\phi}\ \text{RSA} - 0.146$$

In addition, cumulative curves of RSA data from the samples, plotted by computer, are included. Sample plots are not necessarily in consecutive order.

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CH. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	3	82	29	8	0	0	0	CORE 3	29 29.10N	094 23.70W

GALVESTON/CORE 03/000CM(TOP) 07-09-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	4.85	4.85	16.22
.50	.707	2.11	6.96	11.52
1.00	.500	1.28	8.24	8.03
1.50	.354	1.65	9.89	5.41
2.00	.250	2.15	12.04	3.49
2.50	.177	17.31	29.34	2.12
3.00	.125	28.52	57.87	1.22
3.50	.088	25.38	83.25	.67
4.00	.063	16.75	100.00	.43
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.66
50 PCT.				1.42
84 PCT.				2.84

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.88	.136
MEAN	2.70	.154
STANDARD DEVIATION	.95	1.936
SKEWNESS	-1.59	
KURTOSIS	5.36	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	3	82	29	8	0	0	0	CORE 3	29 29.10N	094 23.70W

GALVESTON/CORE 03/000CM(TOP) 07-09-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.39	.39	16.22
.50	.707	9.86	10.25	11.52
1.00	.500	.09	10.34	8.03
1.50	.354	.50	10.84	5.41
2.00	.250	1.47	12.31	3.49
2.50	.177	18.78	31.09	2.12
3.00	.125	25.46	56.56	1.22
3.50	.088	23.97	80.53	.67
4.00	.063	19.47	100.00	.40
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.60
50 PCT.				1.38
84 PCT.				3.10

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.89	.135
MEAN	2.68	.156
STANDARD DEVIATION	1.00	2.000
SKEWNESS	-1.38	
KURTOSIS	4.37	

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	3	82	29	8	30	30	0	CORE 3	29 29.10N	094 23.70W

GALVESTON/CORE 03/030CM(-1.1 FT) 07-09-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.90	.90	16.22
.50	.707	1.52	2.41	11.52
1.00	.500	.77	3.18	8.03
1.50	.354	1.26	4.44	5.41
2.00	.250	2.44	6.88	3.49
2.50	.177	4.84	11.72	2.12
3.00	.125	15.51	27.23	1.22
3.50	.088	35.19	62.42	.67
4.00	.063	37.58	100.00	.40
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.34	.099
MEAN	3.15	.112
STANDARD DEVIATION	.76	1.692
SKEWNESS	-2.24	
KURTOSIS	9.08	

	FALL VELOCITY
16 PCT.	.49
50 PCT.	.80
84 PCT.	1.73

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	3	82	29	8	90	90	0	-CORE 3	29 29.10N	094 23.70W

GALVESTON/CORE 03/090CM(-3.0 FT) 07-09-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.96	.96	11.52
1.00	.500	.03	.99	8.03
1.50	.354	.10	1.09	5.41
2.00	.250	1.05	2.14	3.49
2.50	.177	13.37	15.51	2.12
3.00	.125	28.38	43.89	1.22
3.50	.088	33.53	77.42	.67
4.00	.063	22.58	100.00	.37
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.08	.118
MEAN	3.05	.121
STANDARD DEVIATION	.56	1.478
SKEWNESS	-1.12	
KURTOSIS	6.45	

	FALL VELOCITY
16 PCT.	.57
50 PCT.	1.11
84 PCT.	2.07

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	3	82	29	8	200	200	0	CORE 3	29 29.10N	094 23.70W

GALVESTON/CORE 03/200CM(-6.6 FT) 07-09-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	.17	.17	8.03
1.50	.354	2.23	2.40	5.41
2.00	.250	2.77	5.16	3.49
2.50	.177	14.23	19.39	2.12
3.00	.125	31.89	51.28	1.22
3.50	.088	40.14	91.43	.67
4.00	.063	8.57	100.00	.55
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.98	.127
MEAN	2.90	.134
STANDARD DEVIATION	.51	1.424
SKEWNESS	-1.02	
KURTOSIS	4.39	

	FALL VELOCITY
16 PCT.	.76
50 PCT.	1.24
84 PCT.	2.27

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	3	82	29	8	235	235	0	CORE 3	29 29.10N	094 23.70W

GALVESTON/CORE 03/235CM(-7.7 FT BTM) 07-09-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	2.43	2.43	11.52
1.00	.500	4.16	6.59	8.03
1.50	.354	.83	7.43	5.41
2.00	.250	2.86	10.29	3.49
2.50	.177	6.96	17.25	2.12
3.00	.125	17.67	34.92	1.22
3.50	.088	35.51	70.44	.67
4.00	.063	29.56	100.00	.43
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.25	.105
MEAN	3.00	.125
STANDARD DEVIATION	.84	1.789
SKEWNESS	-1.75	
KURTOSIS	5.71	

	FALL VELOCITY
16 PCT.	.54
50 PCT.	.91
84 PCT.	2.25

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	5	82	29	A	340	340	0	CORE 5	29 28.30N	094 29.00W

GALVESTON/CORE 05/340CM(-11.2 FT) 07-09-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.39	.39	22.72
0.00	1.000	10.66	11.05	16.22
.50	.707	4.04	15.09	11.52
1.00	.500	1.98	17.07	8.03
1.50	.354	1.01	18.08	5.41
2.00	.250	1.64	19.73	3.49
2.50	.177	6.64	26.37	2.12
3.00	.125	23.16	49.53	1.22
3.50	.088	33.90	83.43	.67
4.00	.063	16.57	100.00	.43
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.66
50 PCT.				1.21
84 PCT.				10.93

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.01	.124
MEAN	2.54	.172
STANDARD DEVIATION	1.27	2.412
SKEWNESS	-1.36	
KURTOSIS	3.46	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	5	82	29	A	340	340	0	CORE 5	29 28.30N	094 29.00W

GALVESTON/CORE 05/340CM(-11.2 FT) 07-09-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	4.83	4.83	16.22
.50	.707	4.97	9.79	11.52
1.00	.500	3.23	13.02	8.03
1.50	.354	.91	13.93	5.41
2.00	.250	2.82	16.75	3.49
2.50	.177	10.32	27.07	2.12
3.00	.125	24.62	51.69	1.22
3.50	.088	36.00	87.69	.67
4.00	.063	12.31	100.00	.50
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.72
50 PCT.				1.25
84 PCT.				4.05

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.97	.127
MEAN	2.63	.161
STANDARD DEVIATION	1.04	2.049
SKEWNESS	-1.52	
KURTOSIS	4.25	

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
191	11	82	29	A	140	140	0	CONF11	29 23.40N	094 39.40W

GALVESTON/CORE 11/140CM(-4.5 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.55	.55	22.72
0.00	1.000	.34	.89	16.22
.50	.707	.11	1.01	11.52
1.00	.500	.07	1.08	8.03
1.50	.354	.31	1.39	5.41
2.00	.250	1.20	2.59	3.49
2.50	.177	36.69	39.28	2.12
3.00	.125	38.10	77.38	1.22
3.50	.088	11.36	88.74	.67
4.00	.063	11.26	100.00	.40
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.89
50 PCT.				1.87
84 PCT.				2.72

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.61	.163
MEAN	2.69	.155
STANDARD DEVIATION	.59	1.503
SKEWNESS	-1.02	
KURTOSIS	9.99	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
191	11	82	29	A	200	200	0	CONF11	29 23.40N	094 39.40W

GALVESTON/CORE 11/200CM(-6.5 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.50	.50	11.52
1.00	.500	1.73	2.24	8.03
1.50	.354	1.78	4.02	5.41
2.00	.250	10.15	14.16	3.49
2.50	.177	48.10	62.27	2.12
3.00	.125	37.73	100.00	1.26
3.50	.088	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				1.70
50 PCT.				2.37
84 PCT.				3.43

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.37	.193
MEAN	2.33	.199
STANDARD DEVIATION	.42	1.340
SKEWNESS	-1.57	
KURTOSIS	7.30	

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	11	82	29	A	240	240	0	CORE11	29 23.40N	094 39.40W

GALVESTON/CORE 11/240CM(-7.8 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	4.68	4.68	16.22
.50	.707	3.66	8.34	11.52
1.00	.500	3.47	11.81	8.03
1.50	.354	8.24	20.06	5.41
2.00	.250	11.09	31.15	3.49
2.50	.177	14.69	45.83	2.12
3.00	.125	23.32	69.15	1.22
3.50	.088	19.24	88.39	.67
4.00	.063	11.61	100.00	.43
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.59	.166
MEAN	2.36	.195
STANDARD DEVIATION	1.04	2.052
SKEWNESS	-.77	
KURTOSIS	2.87	

16 PCT.	.79
50 PCT.	1.95
84 PCT.	5.80

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	11	82	29	A	250	250	0	CORE11	29 23.40N	094 39.40W

GALVESTON/CORE 11/250CM(-8.2 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.27	.27	16.22
.50	.707	.91	1.18	11.52
1.00	.500	2.12	3.30	8.03
1.50	.354	3.18	6.48	5.41
2.00	.250	34.02	40.49	3.49
2.50	.177	23.71	64.20	2.12
3.00	.125	28.28	92.48	1.22
3.50	.088	7.52	100.00	1.04
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.19	.219
MEAN	2.20	.218
STANDARD DEVIATION	.59	1.507
SKEWNESS	-.56	
KURTOSIS	3.61	

16 PCT.	1.46
50 PCT.	2.92
84 PCT.	4.86

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	11	82	29	8	270	270	0	CORE11	29 23.40N	094 39.40W

GALVESTON/CORE 11/270CM(-8.8 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
1.00	.500	0.00	0.00	
1.50	.354	1.33	1.33	5.41
2.00	.250	38.18	39.50	3.49
2.50	.177	41.61	81.11	2.12
3.00	.125	18.89	100.00	1.26
3.50	.088	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				1.99
50 PCT.				3.11
84 PCT.				4.26

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.11	.231
MEAN	2.15	.225
STANDARD DEVIATION	.37	1.292
SKEWNESS	.27	
KURTOSIS	2.44	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	11	82	29	8	270	270	0	CORE11	29 23.40N	094 39.40W

GALVESTON/CORE 11/270CM(-8.8 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.63	.63	22.72
0.00	1.000	.56	1.19	16.22
.50	.707	.23	1.42	11.52
1.00	.500	.44	1.86	8.03
1.50	.354	1.49	3.35	5.41
2.00	.250	42.39	45.74	3.49
2.50	.177	30.97	76.72	2.12
3.00	.125	16.10	92.82	1.22
3.50	.088	7.18	100.00	.88
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				1.71
50 PCT.				3.10
84 PCT.				4.49

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.07	.239
MEAN	2.13	.229
STANDARD DEVIATION	.56	1.477
SKEWNESS	-.88	
KURTOSIS	7.36	

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	12	82	29	7	115	115	0	CORE12	29 22.80N	094 41.50W

GALVESTON/CORE 12/115CM(-3.7 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	1.38	1.38	22.72
0.00	1.000	6.44	7.82	16.22
.50	.707	15.64	23.45	11.52
1.00	.500	5.70	29.15	8.03
1.50	.354	3.68	32.83	5.41
2.00	.250	5.57	38.41	3.49
2.50	.177	7.61	46.01	2.12
3.00	.125	16.69	62.71	1.22
3.50	.088	18.60	81.31	.67
4.00	.063	18.69	100.00	.40
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.61
50 PCT.				1.77
84 PCT.				13.30

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.65	.159
MEAN	2.15	.226
STANDARD DEVIATION	1.39	2.628
SKEWNESS	-.49	
KURTOSIS	1.78	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	12	82	29	7	140	140	0	CORE12	29 22.80N	094 41.50W

GALVESTON/CORE 12/140CM(-4.5 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	1.14	1.14	22.72
0.00	1.000	4.63	5.77	16.22
.50	.707	2.93	8.70	11.52
1.00	.500	3.36	12.06	8.03
1.50	.354	2.26	14.32	5.41
2.00	.250	3.78	18.10	3.49
2.50	.177	9.98	28.08	2.12
3.00	.125	15.80	43.88	1.22
3.50	.088	26.50	70.38	.67
4.00	.063	29.62	100.00	.40
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.52
50 PCT.				1.04
84 PCT.				4.25

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.12	.115
MEAN	2.74	.150
STANDARD DEVIATION	1.16	2.236
SKEWNESS	-1.41	
KURTOSIS	4.10	

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	12	82	29	7	240	240	0	CORE12	29 22.80N	094 41.50W

GALVESTON/CORE 12/240CM(-7.8 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.04	.04	22.72
0.00	1.000	.22	.27	16.22
.50	.707	.91	1.18	11.52
1.00	.500	1.89	3.06	8.03
1.50	.354	3.20	6.26	5.41
2.00	.250	5.01	11.27	3.49
2.50	.177	38.67	49.94	2.12
3.00	.125	50.06	100.00	1.26
3.50	.088	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	1.53
50 PCT.	2.12
84 PCT.	3.17

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.50	.177
MEAN	2.38	.192
STANDARD DEVIATION	.50	1.416
SKEWNESS	-2.02	
KURTOSIS	8.50	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	12	82	29	7	440	440	0	CORE12	29 22.80N	094 41.50W

GALVESTON/CORE 12/440CM(-14.4 FT) 07-10-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.99	.99	16.22
.50	.707	1.71	2.70	11.52
1.00	.500	1.03	3.73	8.03
1.50	.354	2.53	6.26	5.41
2.00	.250	4.35	10.60	3.49
2.50	.177	20.02	30.62	2.12
3.00	.125	44.17	74.79	1.22
3.50	.088	25.21	100.00	.89
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	1.08
50 PCT.	1.58
84 PCT.	2.55

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.77	.147
MEAN	2.60	.165
STANDARD DEVIATION	.64	1.557
SKEWNESS	-2.25	
KURTOSIS	8.99	

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	14	82	29	B	0	0	0	CORE14	29 17.40N	094 41.20W

GALVESTON/CORE 14/000CM(TOP) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.24	.24	16.22
.50	.707	3.34	3.58	11.52
1.00	.500	1.41	4.99	8.03
1.50	.354	2.73	7.72	5.41
2.00	.250	11.52	19.24	3.49
2.50	.177	27.57	46.81	2.12
3.00	.125	44.80	91.61	1.22
3.50	.088	8.39	100.00	1.04
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.54	.172
MEAN	2.38	.192
STANDARD DEVIATION	.63	1.551
SKEWNESS	-1.68	
KURTOSIS	6.27	

	FALL VELOCITY
16 PCT.	1.35
50 PCT.	2.01
84 PCT.	3.63

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	14	82	29	B	0	0	0	CORE14	29 17.40N	094 41.20W

GALVESTON/CORE 14/000CM(TOP) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	3.47	3.47	8.03
1.50	.354	2.90	6.37	5.41
2.00	.250	4.96	11.33	3.49
2.50	.177	29.22	40.55	2.12
3.00	.125	51.11	91.67	1.22
3.50	.088	8.33	100.00	1.04
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.59	.166
MEAN	2.47	.180
STANDARD DEVIATION	.52	1.438
SKEWNESS	-1.59	
KURTOSIS	5.88	

	FALL VELOCITY
16 PCT.	1.35
50 PCT.	1.91
84 PCT.	3.14

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	14	82	29	8	62	62	0	CORE14	29 17.40N	094 41.20W

GALVESTON/CORE 14/062CM(-2.0 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	1.10	1.10	11.52
1.00	.500	2.95	4.05	8.03
1.50	.354	2.53	6.58	5.41
2.00	.250	5.46	12.04	3.49
2.50	.177	34.76	46.80	2.12
3.00	.125	53.20	100.00	1.20
3.50	.088	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.53	.173
MEAN	2.43	.186
STANDARD DEVIATION	.51	1.420
SKEWNESS	-2.04	
KURTOSIS	7.61	

16 PCT.	1.49
50 PCT.	2.03
84 PCT.	2.85

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	14	82	29	8	94	94	0	CORE14	29 17.40N	094 41.20W

GALVESTON/CORE 14/094CM(-3.0 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	1.06	1.06	8.03
1.50	.354	1.18	2.25	5.41
2.00	.250	2.67	4.91	3.49
2.50	.177	8.19	13.11	2.12
3.00	.125	31.17	44.28	1.22
3.50	.088	36.58	80.86	.67
4.00	.063	19.14	100.00	.43
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.06	.120
MEAN	3.01	.124
STANDARD DEVIATION	.55	1.469
SKEWNESS	-1.12	
KURTOSIS	5.28	

16 PCT.	.62
50 PCT.	1.14
84 PCT.	2.02

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	14	82	29	A	124	124	0	COHF14	29 17.40N	094 41.20W

GALVESTON/CORE 14/124CM(-4.0 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.20	.20	16.22
.50	.707	1.17	1.37	11.52
1.00	.500	1.15	2.51	8.03
1.50	.354	1.95	4.07	5.41
2.00	.250	4.17	8.64	3.49
2.50	.177	17.59	26.23	2.12
3.00	.125	40.55	66.79	1.22
3.50	.088	33.21	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.83	.140
MEAN	2.71	.153
STANDARD DEVIATION	.58	1.490
SKEWNESS	-1.98	
KURTOSIS	8.39	

	FALL VELOCITY
16 PCT.	.99
50 PCT.	1.47
84 PCT.	2.56

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	14	82	29	A	190	190	0	COHF14	29 17.40N	094 41.20W

GALVESTON/CORE 14/190CM(-6.2 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	1.12	1.12	22.72
0.00	1.000	2.45	3.58	16.22
.50	.707	5.03	8.60	11.52
1.00	.500	1.85	10.46	8.03
1.50	.354	2.05	12.50	5.41
2.00	.250	8.87	21.37	3.49
2.50	.177	11.20	32.57	2.12
3.00	.125	22.48	55.05	1.22
3.50	.088	26.17	81.23	.67
4.00	.063	18.77	100.00	.40
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.90	.134
MEAN	2.63	.162
STANDARD DEVIATION	1.06	2.079
SKEWNESS	-1.28	
KURTOSIS	4.10	

	FALL VELOCITY
16 PCT.	.61
50 PCT.	1.35
84 PCT.	4.17

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	15	82	29	7	40	40	0	CONF15	29 17.80N	094 43.80W

GALVESTON/CORE 15/040CM(-1.3 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	.74	.74	8.03
1.50	.354	.43	1.17	5.41
2.00	.250	2.21	3.38	3.49
2.50	.177	8.23	11.62	2.12
3.00	.125	39.14	50.75	1.22
3.50	.088	41.53	92.29	.67
4.00	.063	7.71	100.00	.55
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.99	.126
MEAN	2.94	.130
STANDARD DEVIATION	.45	1.363
SKEWNESS	-1.23	
KURTOSIS	6.29	

	FALL VELOCITY
16 PCT.	.80
50 PCT.	1.23
84 PCT.	1.95

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	15	82	29	7	40	40	0	CONF15	29 17.80N	094 43.80W

GALVESTON/CORE 15/040CM(-1.3 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.15	.15	16.22
.50	.707	.73	.88	11.52
1.00	.500	.45	1.32	8.03
1.50	.354	2.83	4.15	5.41
2.00	.250	3.16	7.32	3.49
2.50	.177	10.29	17.61	2.12
3.00	.125	31.34	48.95	1.22
3.50	.088	37.06	86.01	.67
4.00	.063	13.99	100.00	.46
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.01	.124
MEAN	2.91	.133
STANDARD DEVIATION	.61	1.523
SKEWNESS	-1.57	
KURTOSIS	7.05	

	FALL VELOCITY
16 PCT.	.70
50 PCT.	1.21
84 PCT.	2.23

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	15	82	29	7	213	213	0	CORE15	29 17.40N	094 43.80W

GALVESTON/CORE 15/213CM(-6.9 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.32	.32	22.72
0.00	1.000	.60	.92	16.22
.50	.707	1.05	1.98	11.52
1.00	.500	1.06	3.04	8.03
1.50	.354	1.51	4.55	5.41
2.00	.250	3.85	8.39	3.49
2.50	.177	7.26	15.65	2.12
3.00	.125	15.48	31.13	1.22
3.50	.088	32.10	63.23	.67
4.00	.063	36.77	100.00	.43
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.51
50 PCT.				.83
84 PCT.				2.04

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.31	.101
MEAN	3.10	.117
STANDARD DEVIATION	.77	1.705
SKEWNESS	-1.98	
KURTOSIS	7.85	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	15	82	29	7	230	230	0	CORE15	29 17.40N	094 43.80W

GALVESTON/CORE 15/230CM(-7.5 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.48	.48	22.72
0.00	1.000	6.87	7.35	16.22
.50	.707	2.86	10.21	11.52
1.00	.500	2.00	12.21	8.03
1.50	.354	2.71	14.93	5.41
2.00	.250	4.69	19.61	3.49
2.50	.177	7.33	26.94	2.12
3.00	.125	39.06	66.01	1.22
3.50	.088	33.99	100.00	.88
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				1.03
50 PCT.				1.45
84 PCT.				[illegible]

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.83	.141
MEAN	2.44	.185
STANDARD DEVIATION	1.02	2.029
SKEWNESS	-1.77	
KURTOSIS	4.96	

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	15	82	29	7	262	262	0	CORE15	29 17.40N	094 43.80W

GALVESTON/CORE 15/262CM(-8.6 FT BTM.) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.21	.21	16.22
.50	.707	1.39	1.60	11.52
1.00	.500	.73	2.33	8.03
1.50	.354	.87	3.20	5.41
2.00	.250	2.45	5.66	3.49
2.50	.177	13.37	19.03	2.12
3.00	.125	39.65	58.67	1.22
3.50	.088	41.33	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.94
50 PCT.				1.33
84 PCT.				2.26

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.91	.133
MEAN	2.79	.144
STANDARD DEVIATION	.55	1.466
SKEWNESS	-2.39	
KURTOSIS	10.98	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	16	82	29	8	56	56	0	CORE16	29 15.20N	094 44.50W

GALVESTON/CORE 16/056CM(-1.8 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	1.71	1.71	22.72
0.00	1.000	2.71	4.42	16.22
.50	.707	.74	5.16	11.52
1.00	.500	1.27	6.42	8.03
1.50	.354	2.61	9.03	5.41
2.00	.250	2.99	12.02	3.49
2.50	.177	12.05	24.07	2.12
3.00	.125	45.36	69.42	1.22
3.50	.088	30.58	100.00	.88
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				1.06
50 PCT.				1.50
84 PCT.				2.46

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.80	.144
MEAN	2.57	.168
STANDARD DEVIATION	.82	1.770
SKEWNESS	-2.51	
KURTOSIS	9.14	

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	16	82	29	8	155	155	0	CORE16	29 15.20N	094 44.50W

GALVESTON/CORE 16/155CM(-5.0 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.23	.23	22.72
0.00	1.000	3.75	3.98	16.22
.50	.707	3.19	7.17	11.52
1.00	.500	2.82	9.99	8.03
1.50	.354	2.39	12.38	5.41
2.00	.250	3.11	15.49	3.49
2.50	.177	6.52	22.02	2.12
3.00	.125	16.65	38.67	1.22
3.50	.088	25.47	64.14	.67
4.00	.063	35.86	100.00	.40
.LT. 4.00	.062	0.00	100.00	

16 PCT.	.49
50 PCT.	.88
84 PCT.	3.36

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.26	.104
MEAN	2.89	.135
STANDARD DEVIATION	1.09	2.125
SKEWNESS	-1.57	
KURTOSIS	4.69	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	16	82	29	8	155	155	0	CORE16	29 15.20N	094 44.50W

GALVESTON/CORE 16/155CM(-5.0 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	3.02	3.02	22.72
0.00	1.000	5.21	8.23	16.22
.50	.707	.80	9.03	11.52
1.00	.500	2.02	11.05	8.03
1.50	.354	3.68	14.72	5.41
2.00	.250	4.27	19.00	3.49
2.50	.177	16.65	35.64	2.12
3.00	.125	15.83	51.47	1.22
3.50	.088	21.43	72.90	.67
4.00	.063	27.10	100.00	.40
.LT. 4.00	.062	0.00	100.00	

16 PCT.	.53
50 PCT.	1.28
84 PCT.	4.49

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.96	.129
MEAN	2.63	.161
STANDARD DEVIATION	1.20	2.297
SKEWNESS	-1.32	
KURTOSIS	4.06	

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0005-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	70	70	0	COHF17	29 16.90N	094 46.40W

GALVESTON/CORE 17/070CM(-2.2 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.14	.14	22.72
0.00	1.000	.20	.34	16.22
.50	.707	.35	.69	11.52
1.00	.500	.97	1.66	8.03
1.50	.354	1.59	3.25	5.41
2.00	.250	2.46	5.71	3.49
2.50	.177	14.71	20.43	2.12
3.00	.125	36.55	56.98	1.22
3.50	.088	38.65	95.62	.67
4.00	.063	4.38	100.00	.61
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.92	.132
MEAN	2.83	.140
STANDARD DEVIATION	.56	1.473
SKEWNESS	-1.90	
KURTOSIS	9.31	

	FALL VELOCITY
16 PCT.	.83
50 PCT.	1.33
84 PCT.	2.31

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	86	86	0	COHF17	29 16.90N	094 46.40W

GALVESTON/CORE 17/086CM(-2.8 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.02	.02	16.22
.50	.707	.59	.61	11.52
1.00	.500	1.50	2.11	8.03
1.50	.354	2.20	4.31	5.41
2.00	.250	2.73	7.04	3.49
2.50	.177	9.86	16.90	2.12
3.00	.125	31.95	48.86	1.22
3.50	.088	40.38	89.24	.67
4.00	.063	10.76	100.00	.55
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.01	.124
MEAN	2.90	.134
STANDARD DEVIATION	.60	1.511
SKEWNESS	-1.69	
KURTOSIS	7.10	

	FALL VELOCITY
16 PCT.	.74
50 PCT.	1.20
84 PCT.	2.17

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	100	100	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/100CM(-3.2 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	2.54	2.54	11.52
1.00	.500	1.86	4.40	8.03
1.50	.354	.78	5.18	5.41
2.00	.250	1.10	6.29	3.49
2.50	.177	13.35	19.63	2.12
3.00	.125	30.36	49.99	1.22
3.50	.088	38.35	88.34	.67
4.00	.063	11.66	100.00	.46
.LT. 4.00	.062	0.00	100.00	

16 PCT.	.74
50 PCT.	1.22
84 PCT.	2.22

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.00	.125
MEAN	2.87	.136
STANDARD DEVIATION	.68	1.601
SKEWNESS	-2.03	
KURTOSIS	8.25	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	150	150	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/150CM(-4.9 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.77	.77	22.72
0.00	1.000	3.12	3.90	16.22
.50	.707	1.17	5.07	11.52
1.00	.500	.18	5.25	8.03
1.50	.354	.76	6.00	5.41
2.00	.250	1.39	7.39	3.49
2.50	.177	4.10	11.49	2.12
3.00	.125	37.95	49.44	1.22
3.50	.088	40.33	89.77	.67
4.00	.063	10.23	100.00	.51
.LT. 4.00	.062	0.00	100.00	

16 PCT.	.77
50 PCT.	1.21
84 PCT.	1.99

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.01	.125
MEAN	2.84	.140
STANDARD DEVIATION	.81	1.750
SKEWNESS	-2.67	
KURTOSIS	10.57	

GALVESTON, TEXAS - JEFF WILLIAMS   PART 1 OF 2   CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	200	200	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/200CM(-6.5 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.020	0.00	0.00	
-.50	1.414	.34	.34	22.72
0.00	1.000	1.01	1.35	16.22
.50	.707	1.18	2.54	11.52
1.00	.500	.88	3.42	8.03
1.50	.354	2.34	5.76	5.41
2.00	.250	5.56	11.32	3.49
2.50	.177	9.23	20.55	2.12
3.00	.125	47.07	67.61	1.22
3.50	.088	32.39	100.00	.88
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.83	.140
MEAN	2.66	.158
STANDARD DEVIATION	.65	1.569
SKEWNESS	-2.51	
KURTOSIS	10.44	

16 PCT.	1.04
50 PCT.	1.49
84 PCT.	2.48

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	200	200	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/200CM(-6.5 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
1.00	.500	0.00	0.00	
1.50	.354	1.20	1.20	5.41
2.00	.250	1.26	2.46	3.49
2.50	.177	6.66	9.13	2.12
3.00	.125	41.22	50.34	1.22
3.50	.088	37.34	87.68	.67
4.00	.063	12.32	100.00	.46
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.00	.125
MEAN	2.98	.127
STANDARD DEVIATION	.88	1.359
SKEWNESS	-.70	
KURTOSIS	4.76	

16 PCT.	.75
50 PCT.	1.22
84 PCT.	1.89

GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	235	235	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/235CM(-7.7 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.18	.18	22.72
0.00	1.000	.79	.97	16.22
.50	.707	.38	1.35	11.52
1.00	.500	3.73	5.08	8.03
1.50	.354	2.16	7.24	5.41
2.00	.250	3.34	10.57	3.49
2.50	.177	8.31	18.88	2.12
3.00	.125	23.66	42.54	1.22
3.50	.088	28.43	70.97	.67
4.00	.063	29.03	100.00	.40
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.13	.114
MEAN	2.97	.128
STANDARD DEVIATION	.81	1.756
SKEWNESS	-1.55	
KURTOSIS	5.75	

	FALL VELOCITY
16 PCT.	.52
50 PCT.	1.04
84 PCT.	2.26

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	270	270	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/270CM(-8.8 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.61	.61	11.52
1.00	.500	1.17	1.78	8.03
1.50	.354	3.63	5.41	5.41
2.00	.250	6.55	11.96	3.49
2.50	.177	18.34	30.30	2.12
3.00	.125	49.92	80.21	1.22
3.50	.088	19.79	100.00	1.04
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.75	.149
MEAN	2.60	.165
STANDARD DEVIATION	.53	1.444
SKEWNESS	-1.72	
KURTOSIS	6.31	

	FALL VELOCITY
16 PCT.	1.18
50 PCT.	1.61
84 PCT.	2.83

GALVESTON, TEXAS - JEFF WILLIAMS   PART 1 OF 2   CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	323	323	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/323CM(-10.5 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.57	.57	16.22
.50	.707	.21	.79	11.52
1.00	.500	.87	1.66	8.03
1.50	.354	1.95	3.61	5.41
2.00	.250	3.46	7.07	3.49
2.50	.177	9.32	16.39	2.12
3.00	.125	43.80	60.18	1.22
3.50	.088	39.82	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.91	.133
MEAN	2.80	.144
STANDARD DEVIATION	.53	1.445
SKEWNESS	-2.41	
KURTOSIS	11.59	

	FALL VELOCITY
16 PCT.	.96
50 PCT.	1.34
84 PCT.	2.13

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	354	354	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/354CM(-11.6 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.19	.19	22.72
0.00	1.000	.51	.70	16.22
.50	.707	1.78	2.48	11.52
1.00	.500	1.54	4.01	8.03
1.50	.354	2.08	6.09	5.41
2.00	.250	2.86	8.95	3.49
2.50	.177	13.39	22.34	2.12
3.00	.125	37.87	60.21	1.22
3.50	.088	39.79	100.00	.68
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.90	.134
MEAN	2.74	.150
STANDARD DEVIATION	.66	1.579
SKEWNESS	-2.28	
KURTOSIS	9.15	

	FALL VELOCITY
16 PCT.	.93
50 PCT.	1.36
84 PCT.	2.47

GALVESTON, TEXAS - JEFF WILLIAMS   PART 1 OF 2   CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	390	390	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/390CM(-12.7 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
1.00	.500	0.00	0.00	
1.50	.354	.49	.49	5.41
2.00	.250	3.30	3.79	3.49
2.50	.177	20.20	23.99	2.12
3.00	.125	44.51	68.50	1.22
3.50	.088	31.50	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.84	.140
MEAN	2.76	.147
STANDARD DEVIATION	.40	1.320
SKEWNESS	-.80	
KURTOSIS	3.41	

	FALL VELOCITY
16 PCT.	1.04
50 PCT.	1.46
84 PCT.	2.53

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	390	390	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/390CM(-12.7 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.88	.88	22.72
0.00	1.000	1.89	2.77	16.22
.50	.707	13.69	16.46	11.52
1.00	.500	1.80	18.26	8.03
1.50	.354	1.78	20.05	5.41
2.00	.250	2.54	22.58	3.49
2.50	.177	9.04	31.62	2.12
3.00	.125	26.06	57.68	1.22
3.50	.088	23.57	81.25	.87
4.00	.063	18.75	100.00	.40
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.88	.136
MEAN	2.50	.177
STANDARD DEVIATION	1.21	2.310
SKEWNESS	-1.06	
KURTOSIS	2.89	

	FALL VELOCITY
16 PCT.	.61
50 PCT.	1.39
84 PCT.	11.73

GALVESTON, TEXAS - JEFF WILLIAMS   PART 1 OF 2   CN. 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	458	458	0	CONF17	29 16.90N	094 46.40W

GALVESTON/CORE 17/458CM(-15.0 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.06	.06	11.52
1.00	.500	1.03	1.08	8.03
1.50	.354	3.41	4.49	5.41
2.00	.250	2.23	6.72	3.49
2.50	.177	8.00	14.73	2.12
3.00	.125	26.81	41.53	1.22
3.50	.088	46.89	88.43	.67
4.00	.063	11.57	100.00	.55
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.72
50 PCT.	1.09
84 PCT.	2.00

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.09	.118
MEAN	2.96	.129
STANDARD DEVIATION	.58	1.493
SKEWNESS	-1.63	
KURTOSIS	6.13	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	500	500	0	CONF17	29 16.90N	094 46.40W

GALVESTON/CORE 17/500CM(-16.4 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	1.08	1.08	8.03
1.50	.354	.85	1.93	5.41
2.00	.250	4.16	6.09	3.49
2.50	.177	8.68	14.77	2.12
3.00	.125	32.59	47.36	1.22
3.50	.088	52.64	100.00	.68
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.86
50 PCT.	1.19
84 PCT.	2.07

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.02	.123
MEAN	2.90	.134
STANDARD DEVIATION	.48	1.392
SKEWNESS	-1.82	
KURTOSIS	7.42	

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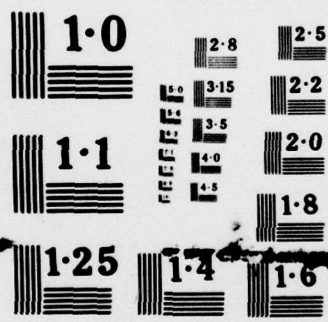

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GALVESTON, TEXAS - JEFF WILLIAMS PART 1 OF 2 CN, 0003-0017

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	17	82	29	7	570	570	0	CORE17	29 16.90N	094 46.40W

GALVESTON/CORE 17/570CM(=18.7 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.70	.70	16.22
.50	.707	1.22	1.91	11.52
1.00	.500	2.97	4.88	8.03
1.50	.354	2.23	7.11	5.41
2.00	.250	4.47	11.58	3.49
2.50	.177	8.41	19.99	2.12
3.00	.125	43.36	63.34	1.22
3.50	.088	36.66	100.00	.88
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				1.02
50 PCT.				1.44
84 PCT.				2.42

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.86	.138
MEAN	2.68	.157
STANDARD DEVIATION	.65	1.565
SKEWNESS	-2.18	
KURTOSIS	7.93	

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	1A	82	29	7	0	0	0	CORE1A	29 16.50N	094 47.20W

GALVESTON/CORE 1A/000CM(TOP)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	1.15	1.15	11.52
1.00	.500	1.06	2.21	8.03
1.50	.354	2.62	4.83	5.41
2.00	.250	3.77	8.60	3.49
2.50	.177	14.91	23.51	2.12
3.00	.125	39.61	63.12	1.22
3.50	.088	36.88	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

16 PCT.	.97
50 PCT.	1.42
84 PCT.	2.43

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.85	.139
MEAN	2.73	.151
STANDARD DEVIATION	.57	1.480
SKEWNESS	-1.84	
KURTOSIS	7.27	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	1A	82	29	7	70	70	0	CORE18	29 16.50N	094 47.20W

GALVESTON/CORE 1A/070CM(=2.2 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.77	.77	22.72
0.00	1.000	1.82	2.59	16.22
.50	.707	.76	3.36	11.52
1.00	.500	.49	3.84	8.03
1.50	.354	3.12	6.96	5.41
2.00	.250	5.31	12.27	3.49
2.50	.177	10.82	23.09	2.12
3.00	.125	38.02	61.11	1.22
3.50	.088	38.89	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

16 PCT.	.96
50 PCT.	1.35
84 PCT.	2.64

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.88	.136
MEAN	2.68	.156
STANDARD DEVIATION	.75	1.678
SKEWNESS	-2.35	
KURTOSIS	9.32	

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0010-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	18	82	29	7	70	70	0	CORE1A	29 16.50N	094 47.20W

GALVESTON/CORE 18/070CM(-2.2 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	.64	.64	8.03
1.50	.354	4.17	4.81	5.41
2.00	.250	5.63	10.44	3.49
2.50	.177	9.82	20.26	2.12
3.00	.125	48.77	69.03	1.22
3.50	.088	30.97	100.00	.88
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				1.05
50 PCT.				1.47
84 PCT.				2.44

	STATISTICAL PARAMETERS PHI	MM.
MEDIAN	2.83	.141
MEAN	2.70	.153
STANDARD DEVIATION	.49	1.408
SKEWNESS	-1.57	
KURTOSIS	5.25	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	18	82	29	7	120	120	0	CORE18	29 16.50N	094 47.20W

GALVESTON/CORE 18/120CM(-3.9 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.87	.87	22.72
0.00	1.000	1.48	2.35	16.22
.50	.707	.30	2.65	11.52
1.00	.500	.72	3.37	8.03
1.50	.354	2.10	5.47	5.41
2.00	.250	3.73	9.20	3.49
2.50	.177	6.75	15.95	2.12
3.00	.125	24.17	40.12	1.22
3.50	.088	42.14	82.26	.67
4.00	.063	17.74	100.00	.50
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.65
50 PCT.				1.06
84 PCT.				2.11

	STATISTICAL PARAMETERS PHI	MM.
MEDIAN	3.11	.116
MEAN	2.91	.133
STANDARD DEVIATION	.78	1.719
SKEWNESS	-2.35	
KURTOSIS	9.80	

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	18	82	29	7	220	220	0	CORE18	29 16.50N	094 47.20W

GALVESTON/CORE 18/220CM(-7.2 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
1.00	.500	0.00	0.00	
1.50	.354	1.29	1.29	5.41
2.00	.250	7.07	8.36	3.49
2.50	.177	14.97	23.32	2.12
3.00	.125	40.28	63.61	1.22
3.50	.088	36.39	100.00	.88
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.87	.137
MEAN	2.75	.149
STANDARD DEVIATION	.45	1.362
SKEWNESS	-1.22	
KURTOSIS	4.11	

	FALL VELOCITY
16 PCT.	1.03
50 PCT.	1.39
84 PCT.	2.52

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	18	82	29	7	310	310	0	CORE18	29 16.50N	094 47.20W

GALVESTON/CORE 18/310CM(-10.1 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.33	.33	11.92
1.00	.500	.69	1.02	8.03
1.50	.354	3.55	4.57	5.41
2.00	.250	3.38	7.94	3.49
2.50	.177	9.62	17.57	2.12
3.00	.125	28.28	45.85	1.22
3.50	.088	49.31	95.15	.67
4.00	.063	4.85	100.00	.61
.LT. 4.00	.052	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.04	.122
MEAN	2.89	.135
STANDARD DEVIATION	.57	1.487
SKEWNESS	-1.04	
KURTOSIS	6.03	

	FALL VELOCITY
16 PCT.	.80
50 PCT.	1.17
84 PCT.	2.18

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CR. 0010-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	18	82	29	7	365	365	0	CORE1A	29 10.50N	094 47.20W

GALVESTON/CORE 18/365CM(-11.9 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	.33	.33	8.03
1.50	.354	.10	.43	5.41
2.00	.250	.97	1.41	3.49
2.50	.177	2.97	4.38	2.12
3.00	.125	14.75	19.13	1.22
3.50	.088	46.00	65.13	.67
4.00	.063	34.87	100.00	.40
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.36	.098
MEAN	3.30	.102
STANDARD DEVIATION	.43	1.349
SKEWNESS	-1.49	
KURTOSIS	7.93	

	FALL VELOCITY
16 PCT.	.53
50 PCT.	.79
84 PCT.	1.36

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	18	82	29	7	396	396	0	CORE1A	29 10.50N	094 47.20W

GALVESTON/CORE 18/396CM(-12.9 FT) 07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.02	.02	22.72
0.00	1.000	1.34	1.37	16.22
.50	.707	1.48	2.85	11.52
1.00	.500	1.07	3.92	8.03
1.50	.354	1.01	4.93	5.41
2.00	.250	1.48	6.41	3.49
2.50	.177	4.38	10.79	2.12
3.00	.125	15.26	26.05	1.22
3.50	.088	45.91	71.95	.67
4.00	.063	28.05	100.00	.43
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.28	.103
MEAN	3.11	.116
STANDARD DEVIATION	.75	1.678
SKEWNESS	-2.57	
KURTOSIS	10.59	

	FALL VELOCITY
16 PCT.	.56
50 PCT.	.87
84 PCT.	1.53

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0038-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	18	82	29	7	396	396	0	CORE18	29 16.50N	094 47.20W

GALVESTON/CORE 18/396CM(-12.9 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.87	.87	22.72
0.00	1.000	2.15	3.02	16.22
.50	.707	.55	3.57	11.52
1.00	.500	.38	3.94	8.03
1.50	.354	.97	4.92	5.41
2.00	.250	3.49	8.41	3.49
2.50	.177	11.16	19.57	2.12
3.00	.125	25.28	44.86	1.22
3.50	.088	55.14	100.00	.68
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.05	.121
MEAN	2.82	.142
STANDARD DEVIATION	.76	1.690
SKEWNESS	-2.64	
KURTOSIS	10.92	

	FALL VELOCITY
16 PCT.	.79
50 PCT.	1.15
84 PCT.	2.32

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	19	82	29	8	210	210	0	CORE19	29 14.10N	094 49.10W

GALVESTON/CORE 19/210CM(-6.8 FT)   07-11-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	2.24	2.24	8.03
1.50	.354	.83	3.07	5.41
2.00	.250	2.49	5.56	3.49
2.50	.177	10.04	15.60	2.12
3.00	.125	24.54	40.14	1.22
3.50	.088	29.54	69.68	.67
4.00	.063	30.32	100.00	.37
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.16	.112
MEAN	3.08	.118
STANDARD DEVIATION	.65	1.569
SKEWNESS	-1.09	
KURTOSIS	4.54	

	FALL VELOCITY
16 PCT.	.49
50 PCT.	1.01
84 PCT.	2.09

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	21	82	29	7	0	0	0	CORE21	29 10.90N	094 50.80W

GALVESTON/CORE 21/000CM(TOP)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.17	.17	22.72
0.00	1.000	.79	.96	16.22
.50	.707	.71	1.67	11.52
1.00	.500	2.16	3.83	8.03
1.50	.354	3.23	7.06	5.41
2.00	.250	4.78	11.84	3.49
2.50	.177	8.54	20.38	2.12
3.00	.125	34.16	54.56	1.22
3.50	.088	45.44	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.92
50 PCT.	1.29
84 PCT.	2.67

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.93	.131
MEAN	2.73	.151
STANDARD DEVIATION	.68	1.607
SKEWNESS	-2.02	
KURTOSIS	7.57	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	21	82	29	7	50	50	0	CORE21	29 10.90N	094 50.80W

GALVESTON/CORE 21/050CM(=1.6 FT)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.87	.87	22.72
0.00	1.000	1.74	2.61	16.22
.50	.707	.37	2.97	11.52
1.00	.500	.72	3.70	8.03
1.50	.354	1.25	4.94	5.41
2.00	.250	4.44	9.38	3.49
2.50	.177	7.68	17.06	2.12
3.00	.125	26.19	43.26	1.22
3.50	.088	50.31	93.57	.67
4.00	.063	6.43	100.00	.61
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.74
50 PCT.	1.11
84 PCT.	2.29

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.07	.119
MEAN	2.86	.137
STANDARD DEVIATION	.76	1.697
SKEWNESS	-2.52	
KURTOSIS	10.54	

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	21	82	29	7	80	80	0	CORE21	29 10.90N	094 56.80W

GALVESTON/CORE21/080CM(=2.6 FT)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.36	.36	11.52
1.00	.500	.19	.55	8.03
1.50	.354	.88	1.43	5.41
2.00	.250	4.12	5.55	3.49
2.50	.177	7.06	12.61	2.12
3.00	.125	23.16	35.76	1.22
3.50	.088	38.10	73.86	.67
4.00	.063	26.14	100.00	.40
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.55
50 PCT.				.96
84 PCT.				1.95

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.18	.110
MEAN	3.10	.117
STANDARD DEVIATION	.58	1.499
SKEWNESS	-1.21	
KURTOSIS	5.29	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	21	82	29	7	125	125	0	CORE21	29 10.90N	094 56.80W

GALVESTON/CORE 21/125CM(=4.1 FT)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	1.04	1.04	8.03
1.50	.354	.29	1.33	5.41
2.00	.250	2.00	3.33	3.49
2.50	.177	2.51	5.84	2.12
3.00	.125	40.83	46.67	1.22
3.50	.088	49.51	96.18	.67
4.00	.063	3.82	100.00	.61
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.84
50 PCT.				1.19
84 PCT.				1.81

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.03	.123
MEAN	2.97	.128
STANDARD DEVIATION	.41	1.333
SKEWNESS	-1.96	
KURTOSIS	10.03	

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	21	82	29	7	125	125	0	CORE21	29 10.90N	094 56.80W

GALVESTON/CORE 21/125CM(=4.1 FT)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
1.00	.500	0.00	0.00	
1.50	.354	.89	.89	5.41
2.00	.250	4.08	4.97	3.49
2.50	.177	14.93	19.90	2.12
3.00	.125	38.59	58.49	1.22
3.50	.088	41.51	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.95
50 PCT.				1.36
84 PCT.				2.23

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.89	.135
MEAN	2.82	.142
STANDARD DEVIATION	.42	1.341
SKEWNESS	-.93	
KURTOSIS	3.73	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	21	82	29	7	200	200	0	CORE21	29 10.90N	094 56.80W

GALVESTON/CORE 21/200CM(=6.5 FT)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	2.17	2.17	27.72
0.00	1.000	3.43	5.60	16.22
.50	.707	2.19	7.80	11.82
1.00	.500	3.08	10.87	8.03
1.50	.354	2.11	12.99	5.41
2.00	.250	2.42	15.41	3.49
2.50	.177	4.30	19.71	2.12
3.00	.125	25.91	45.63	1.22
3.50	.088	33.13	78.76	.67
4.00	.063	21.24	100.00	.43
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.59
50 PCT.				1.11
84 PCT.				3.03

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.06	.120
MEAN	2.75	.149
STANDARD DEVIATION	1.09	2.133
SKEWNESS	-1.73	
KURTOSIS	5.28	

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	21	82	29	7	350	350	0	CORE21	29 10.90N	094 56.60W

GALVESTON/CORE 21/350CM(-11.4 FT) 07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.90	.90	16.22
.50	.707	.95	1.86	11.52
1.00	.500	.72	2.58	8.03
1.50	.354	.72	3.30	5.41
2.00	.250	2.57	5.87	3.49
2.50	.177	8.21	14.08	2.12
3.00	.125	41.54	55.62	1.22
3.50	.088	40.62	96.24	.67
4.00	.063	3.76	100.00	.61
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.94	.130
MEAN	2.85	.139
STANDARD DEVIATION	.59	1.507
SKEWNESS	-2.68	
KURTOSIS	13.17	

16 PCT.	.87
50 PCT.	1.29
84 PCT.	2.04

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	22	82	29	7	140	140	0	CORE22	29 09.00N	094 59.90W

2
GALVESTON/CORE 28/140CM(-4.5 FT) 07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	2.07	2.07	11.52
1.00	.500	1.10	3.17	8.03
1.50	.354	3.22	6.39	5.41
2.00	.250	4.63	11.01	3.49
2.50	.177	7.94	18.96	2.12
3.00	.125	46.10	65.06	1.22
3.50	.088	34.94	100.00	.88
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.87	.137
MEAN	2.70	.154
STANDARD DEVIATION	.60	1.520
SKEWNESS	-2.09	
KURTOSIS	7.52	

16 PCT.	1.02
50 PCT.	1.41
84 PCT.	2.54

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	22	82	29	7	180	180	0	CORE22	29 09.00N	094 59.90W

GALVESTON/CORE 22/180CM(-5.9 FT)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.57	.57	16.22
.50	.707	.95	1.51	11.52
1.00	.500	1.35	2.86	8.03
1.50	.354	1.50	4.35	5.41
2.00	.250	3.31	7.67	3.49
2.50	.177	7.51	15.18	2.12
3.00	.125	33.90	49.07	1.22
3.50	.088	38.98	88.05	.67
4.00	.063	11.95	100.00	.55
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.72
50 PCT.				1.20
84 PCT.				2.10

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.01	.124
MEAN	2.89	.135
STANDARD DEVIATION	.65	1.568
SKEWNESS	-1.97	
KURTOSIS	8.31	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	23	82	29	8	98	98	0	CORE23	29 09.90N	095 01.70W

GALVESTON/CORE 23/098CM(-3.2 FT)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.50	.50	16.22
.50	.707	.95	1.45	11.52
1.00	.500	1.64	3.09	8.03
1.50	.354	1.59	4.68	5.41
2.00	.250	3.71	8.39	3.49
2.50	.177	6.61	14.99	2.12
3.00	.125	19.42	34.41	1.22
3.50	.088	41.36	75.77	.67
4.00	.063	24.23	100.00	.50
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.61
50 PCT.				.91
84 PCT.				2.03

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.24	.106
MEAN	3.02	.123
STANDARD DEVIATION	.70	1.626
SKEWNESS	-2.03	
KURTOSIS	7.77	

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	23	82	29	8	98	98	0	CORE23	29 09.90N	095 01.70W

GALVESTON/CORE 23/098CM(-3.2 FT) 07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.03	.03	11.52
1.00	.500	.59	.62	8.03
1.50	.354	.56	1.19	5.41
2.00	.250	1.46	2.65	3.49
2.50	.177	2.96	5.61	2.12
3.00	.125	12.51	18.12	1.22
3.50	.088	41.36	59.48	.67
4.00	.063	40.52	100.00	.40
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.41	.094
MEAN	3.32	.100
STANDARD DEVIATION	.49	1.407
SKEWNESS	-1.97	
KURTOSIS	9.21	

16 PCT.	.50
50 PCT.	.74
84 PCT.	1.28

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	23	82	29	8	300	300	0	CORE23	29 09.90N	095 01.70W

GALVESTON/CORE 23/300CM(-9.8 FT) 07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	.75	.75	8.03
1.50	.354	1.07	1.82	5.41
2.00	.250	2.47	4.29	3.49
2.50	.177	15.85	20.14	2.12
3.00	.125	35.90	56.05	1.22
3.50	.088	39.21	95.26	.67
4.00	.063	4.74	100.00	.61
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.93	.131
MEAN	2.87	.137
STANDARD DEVIATION	.48	1.398
SKEWNESS	-1.20	
KURTOSIS	5.74	

16 PCT.	.81
50 PCT.	1.34
84 PCT.	2.26

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	23	82	29	8	380	380	0	CORE23	29 09.90N	095 01.70W

GALVESTON/CORE 23/380CM(-12.4 FT) 07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.40	.40	22.72
0.00	1.000	1.67	2.07	16.22
.50	.707	.51	2.58	11.52
1.00	.500	.39	2.97	8.03
1.50	.354	.52	3.49	5.41
2.00	.250	1.37	4.80	3.49
2.50	.177	8.95	13.82	2.12
3.00	.125	30.51	44.32	1.22
3.50	.088	33.47	77.80	.67
4.00	.063	22.20	100.00	.40
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.08	.118
MEAN	3.00	.125
STANDARD DEVIATION	.73	1.653
SKEWNESS	-2.38	
KURTOSIS	11.50	

16 PCT.	.58
50 PCT.	1.11
84 PCT.	2.00

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	23	82	29	8	469	469	0	CORE23	29 09.90N	095 01.70W

GALVESTON/CORE 23/469CM(-15.4 FT BTM) 07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.20	.20	22.72
0.00	1.000	1.53	1.73	16.22
.50	.707	.46	2.19	11.52
1.00	.500	4.32	6.51	8.03
1.50	.354	2.89	9.40	5.41
2.00	.250	3.95	13.35	3.49
2.50	.177	16.57	29.92	2.12
3.00	.125	38.43	68.35	1.22
3.50	.088	31.65	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.80	.143
MEAN	2.60	.165
STANDARD DEVIATION	.74	1.676
SKEWNESS	-1.95	
KURTOSIS	7.01	

16 PCT.	1.00
50 PCT.	1.52
84 PCT.	2.68

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0016-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	24	82	29	7	0	0	0	CORE24	29 07.50N	095 02.40W

GALVESTON/CORE 24/000CM(TOP)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.47	.47	16.22
.50	.707	1.84	2.31	11.52
1.00	.500	1.11	3.42	8.03
1.50	.354	2.14	5.55	5.41
2.00	.250	2.33	7.88	3.49
2.50	.177	10.26	18.14	2.12
3.00	.125	23.72	41.86	1.22
3.50	.088	39.62	81.48	.67
4.00	.063	18.52	100.00	.40
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.09	.117
MEAN	2.95	.129
STANDARD DEVIATION	.72	1.652
SKEWNESS	-1.80	
KURTOSIS	7.18	

	FALL VELOCITY
16 PCT.	.62
50 PCT.	1.08
84 PCT.	2.34

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	24	82	29	7	45	45	0	CORE24	29 07.50N	095 02.40W

GALVESTON/CORE 24/045CM(-1.4 FT)   07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	4.53	4.53	16.22
.50	.707	4.39	8.92	11.52
1.00	.500	2.39	11.31	8.03
1.50	.354	1.60	12.92	5.41
2.00	.250	1.37	14.28	3.49
2.50	.177	12.88	27.16	2.12
3.00	.125	35.65	62.81	1.22
3.50	.088	30.79	93.60	.67
4.00	.063	6.40	100.00	.50
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.84	.140
MEAN	2.57	.169
STANDARD DEVIATION	.96	1.940
SKEWNESS	-1.68	
KURTOSIS	4.99	

	FALL VELOCITY
16 PCT.	.90
50 PCT.	1.47
84 PCT.	3.15

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	24	82	29	7	45	45	0	CORE24	29 07.50N	095 02.40W

GALVESTON/CORE 24/045CM(-1.4 FT) 07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.09	.09	22.72
0.00	1.000	1.35	1.43	16.22
.50	.707	2.80	4.24	11.52
1.00	.500	3.29	7.53	8.03
1.50	.354	2.78	10.31	5.41
2.00	.250	4.37	14.68	3.49
2.50	.177	16.48	31.16	2.12
3.00	.125	42.92	74.08	1.22
3.50	.088	25.92	100.00	.88
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				1.09
50 PCT.				1.62
84 PCT.				3.34

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.75	.149
MEAN	2.51	.175
STANDARD DEVIATION	.76	1.691
SKEWNESS	-1.85	
KURTOSIS	6.12	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	24	82	29	7	102	102	0	CORE24	29 07.50N	095 02.40W

GALVESTON/CORE 24/102CM(-3.3 FT) 07-12-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	3.07	3.07	22.72
0.00	1.000	11.44	14.51	16.22
.50	.707	6.32	20.83	11.52
1.00	.500	.17	20.99	8.03
1.50	.354	1.67	22.66	5.41
2.00	.250	1.96	24.62	3.49
2.50	.177	10.67	35.29	2.12
3.00	.125	24.04	59.33	1.22
3.50	.088	29.65	88.97	.67
4.00	.063	11.03	100.00	.46
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.78
50 PCT.				1.42
84 PCT.				15.89

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.86	.138
MEAN	2.30	.203
STANDARD DEVIATION	1.35	2.555
SKEWNESS	-1.08	
KURTOSIS	2.64	

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	25	82	29	8	0	0	0	CORE25	29 05.10N	095 04.60W

GALVESTON/CORE 25/000CM(TOP) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	.70	.70	8.03
1.50	.354	1.68	2.38	5.41
2.00	.250	2.40	4.78	3.49
2.50	.177	9.30	14.08	2.12
3.00	.125	28.57	42.66	1.22
3.50	.088	57.34	100.00	.68
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.81
50 PCT.				1.13
84 PCT.				2.03

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.06	.120
MEAN	2.94	.131
STANDARD DEVIATION	.48	1.391
SKEWNESS	-1.79	
KURTOSIS	6.92	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	29	82	29	8	120	120	0	CORE25	29 05.10N	095 04.60W

GALVESTON//CORE 25/120CM(-3.9 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.13	.13	22.72
0.00	1.000	.16	.29	16.22
.50	.707	.06	.35	11.52
1.00	.500	.93	1.28	8.03
1.50	.354	.69	1.97	5.41
2.00	.250	2.46	4.43	3.49
2.50	.177	7.67	12.10	2.12
3.00	.125	29.64	41.74	1.22
3.50	.088	52.32	94.06	.67
4.00	.063	5.94	100.00	.61
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.76
50 PCT.				1.10
84 PCT.				1.96

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.08	.118
MEAN	2.98	.127
STANDARD DEVIATION	.51	1.420
SKEWNESS	-2.23	
KURTOSIS	11.90	

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	25	82	29	8	148	148	0	CORE25	29 05.10N	095 04.00W

GALVESTON/CORE 25/148CM(-4.8 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.10	.10	16.22
.50	.707	.38	.48	11.52
1.00	.500	.55	1.03	8.03
1.50	.354	1.26	2.28	5.41
2.00	.250	2.62	4.90	3.49
2.50	.177	17.97	22.87	2.12
3.00	.125	24.07	46.95	1.22
3.50	.088	34.14	81.08	.67
4.00	.063	18.92	100.00	.46
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.63
50 PCT.	1.16
84 PCT.	2.38

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.04	.121
MEAN	2.94	.130
STANDARD DEVIATION	.60	1.513
SKEWNESS	-1.09	
KURTOSIS	5.24	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	25	82	29	8	200	200	0	CORE25	29 05.10N	095 04.00-

GALVESTON/CORE 25/200CM(-6.5 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
1.00	.500	0.00	0.00	
1.50	.354	4.12	4.12	5.41
2.00	.250	5.52	9.65	3.49
2.50	.177	17.47	27.10	2.12
3.00	.125	40.86	67.96	1.22
3.50	.088	32.04	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.99
50 PCT.	1.51
84 PCT.	2.76

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.81	.143
MEAN	2.71	.153
STANDARD DEVIATION	.51	1.422
SKEWNESS	-1.03	
KURTOSIS	3.79	

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	25	82	29	A	200	200	0	CORE25	29 05.10N	095 04.00W

GALVESTON/CORE 25/200CM(-6.5 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
1.50	.354	0.00	0.00	
2.00	.250	1.27	1.27	3.49
2.50	.177	10.05	11.33	2.12
3.00	.125	36.14	47.47	1.22
3.50	.088	33.59	81.06	.67
4.00	.063	18.94	100.00	.40
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.03	.122
MEAN	3.04	.121
STANDARD DEVIATION	.46	1.375
SKEWNESS	-.01	
KURTOSIS	2.43	

	FALL VELOCITY
16 PCT.	.61
50 PCT.	1.17
84 PCT.	2.00

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	25	82	29	A	250	250	0	CORE25	29 05.10N	095 04.00W

GALVESTON/CORE 25/250CM(-8.2 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.04	.04	11.52
1.00	.500	1.44	1.48	8.03
1.50	.354	2.17	3.65	5.41
2.00	.250	2.41	6.06	3.49
2.50	.177	45.42	51.48	2.12
3.00	.125	42.09	93.57	1.22
3.50	.088	6.43	100.00	1.04
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.48	.179
MEAN	2.46	.184
STANDARD DEVIATION	.42	1.341
SKEWNESS	-1.19	
KURTOSIS	6.13	

	FALL VELOCITY
16 PCT.	1.46
50 PCT.	2.16
84 PCT.	3.10

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	25	82	29	8	350	350	0	CORE25	29 05.10N	095 04.60W

GALVESTON/CORE 25/350CM(=11.4 FT)   07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
1.00	.500	0.00	0.00	
1.50	.354	.11	.11	5.41
2.00	.250	14.74	14.85	3.49
2.50	.177	31.22	46.07	2.12
3.00	.125	21.95	68.02	1.22
3.50	.088	18.22	86.24	.67
4.00	.063	13.76	100.00	.43
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.59	.167
MEAN	2.68	.156
STANDARD DEVIATION	.61	1.528
SKEWNESS	.32	
KURTOSIS	1.94	

	FALL VELOCITY
16 PCT.	.72
50 PCT.	1.95
84 PCT.	3.45

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	25	82	29	8	400	400	0	CORE25	29 05.10N	095 04.60W

GALVESTON/CORE 25/400CM(=13.1 FT)   07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
1.50	.354	0.00	0.00	
2.00	.250	23.56	23.56	3.49
2.50	.177	36.24	59.79	2.12
3.00	.125	23.71	83.50	1.22
3.50	.088	13.99	97.50	.67
4.00	.063	2.50	100.00	.61
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.36	.195
MEAN	2.44	.184
STANDARD DEVIATION	.50	1.413
SKEWNESS	.62	
KURTOSIS	2.02	

	FALL VELOCITY
16 PCT.	1.19
50 PCT.	2.44
84 PCT.	3.73

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	25	82	29	8	405	405	0	CORE25	29 05.10N	095 04.60W

GALVESTON/CORE 25/405CM(-13.3 FT BTM) 07-13-77

PHI SIZE	MM., SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.06	.06	16.22
.50	.707	.37	.43	11.52
1.00	.500	.86	1.29	8.03
1.50	.354	2.11	3.41	5.41
2.00	.250	40.44	43.85	3.49
2.50	.177	45.02	88.87	2.12
3.00	.125	11.13	100.00	1.61
3.50	.088	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.06	.239
MEAN	2.06	.239
STANDARD DEVIATION	.37	1.289
SKEWNESS	-1.00	
KURTOSIS	6.53	

	FALL VELOCITY
16 PCT.	2.28
50 PCT.	3.27
84 PCT.	4.34

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	26	82	29	8	80	80	0	CORE26	29 02.50N	095 04.20W

GALVESTON/CORE 26/080CM(-2.6 FT) 07-13-77

PHI SIZE	MM., SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	.51	.51	8.03
1.50	.354	.65	1.15	5.41
2.00	.250	1.62	2.77	3.49
2.50	.177	4.54	7.31	2.12
3.00	.125	20.59	27.90	1.22
3.50	.088	36.50	64.40	.67
4.00	.063	35.60	100.00	.38
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.34	.098
MEAN	3.24	.106
STANDARD DEVIATION	.52	1.438
SKEWNESS	-1.33	
KURTOSIS	5.79	

	FALL VELOCITY
16 PCT.	.50
50 PCT.	.81
84 PCT.	1.65

GALVESTON, TEXAS J JEFF WILLIAMS   PART 2 OF 2   CN. 0016-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	26	82	29	8	80	80	0	CORE26	29 02.50N	095 04.20W

GALVESTON/CORE 26/080CM(=2.6 FT)   07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.70	.70	22.72
0.00	1.000	.52	1.22	16.22
.50	.707	.26	1.49	11.52
1.00	.500	.00	1.49	8.03
1.50	.354	1.51	3.00	5.41
2.00	.250	2.95	5.94	3.49
2.50	.177	10.22	16.17	2.12
3.00	.125	18.30	34.47	1.22
3.50	.088	44.34	78.81	.67
4.00	.063	21.19	100.00	.50
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.19	.109
MEAN	3.02	.123
STANDARD DEVIATION	.67	1.590
SKEWNESS	-2.42	
KURTOSIS	11.73	

	FALL VELOCITY
16 PCT.	.63
50 PCT.	.95
84 PCT.	2.14

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	27	82	29	7	0	0	0	CORE27	29 03.40N	095 07.50W

GALVESTON/CORE 27/000CM(TOP)   07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	.42	.42	16.22
.50	.707	.58	1.00	11.52
1.00	.500	1.79	2.80	8.03
1.50	.354	1.93	4.73	5.41
2.00	.250	1.95	6.67	3.49
2.50	.177	16.46	23.13	2.12
3.00	.125	41.46	64.59	1.22
3.50	.088	35.41	100.00	.77
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.86	.138
MEAN	2.73	.151
STANDARD DEVIATION	.58	1.491
SKEWNESS	-2.16	
KURTOSIS	9.22	

	FALL VELOCITY
16 PCT.	.99
50 PCT.	1.43
84 PCT.	2.53

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	27	82	29	7	50	50	0	CORE27	29 03.40N	095 07.50W

GALVESTON/CORE 27/050CM(-1.6 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.45	.45	11.52
1.00	.500	2.17	2.62	8.03
1.50	.354	2.53	5.15	5.41
2.00	.250	3.84	9.00	3.49
2.50	.177	8.81	17.80	2.12
3.00	.125	41.54	59.34	1.22
3.50	.088	40.66	100.00	.78
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.94
50 PCT.				1.38
84 PCT.				2.25

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.89	.135
MEAN	2.76	.147
STANDARD DEVIATION	.57	1.484
SKEWNESS	-1.05	
KURTOSIS	6.88	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	27	82	29	7	100	100	0	CORE27	29 03.40N	095 07.50W

GALVESTON/CORE 27/100CM(-3.2 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	2.54	2.54	16.22
.50	.707	3.76	6.30	11.52
1.00	.500	.40	6.70	8.03
1.50	.354	.72	7.42	5.41
2.00	.250	1.33	8.75	3.49
2.50	.177	17.81	26.56	2.12
3.00	.125	27.58	54.14	1.22
3.50	.088	32.59	86.73	.67
4.00	.063	13.27	100.00	.46
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.72
50 PCT.				1.28
84 PCT.				2.53

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.94	.130
MEAN	2.76	.147
STANDARD DEVIATION	.86	1.810
SKEWNESS	-1.99	
KURTOSIS	7.30	

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	27	82	29	7	150	150	0	CORE27	29 03.40N	095 07.50W

GALVESTON/CORE 28/000CM(TOP)   07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.04	.04	22.72
0.00	1.000	8.16	8.21	16.22
.50	.707	4.35	12.56	11.52
1.00	.500	4.52	17.08	8.03
1.50	.354	3.32	20.40	5.41
2.00	.250	2.22	22.63	3.49
2.50	.177	8.34	30.97	2.12
3.00	.125	19.53	50.49	1.22
3.50	.088	25.68	76.17	.67
4.00	.063	23.83	100.00	.37
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	2.99	.126
MEAN	2.57	.169
STANDARD DEVIATION	1.24	2.369
SKEWNESS	-1.12	
KURTOSIS	3.04	

	FALL VELOCITY
16 PCT.	.55
50 PCT.	1.23
84 PCT.	8.38

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	28	82	29	7	0	0	0	CORE28	29 02.70N	095 09.10W

GALVESTON/CORE 28/000CM(TOP)   07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	1.20	1.20	22.72
0.00	1.000	1.99	3.19	16.22
.50	.707	1.71	4.90	11.52
1.00	.500	2.57	7.47	8.03
1.50	.354	2.63	10.09	5.41
2.00	.250	3.56	13.65	3.49
2.50	.177	6.71	20.36	2.12
3.00	.125	28.21	48.56	1.22
3.50	.088	41.50	90.07	.67
4.00	.063	9.93	100.00	.55
.LT. 4.00	.062	0.00	100.00	

STATISTICAL PARAMETERS	PHI	MM.
MEDIAN	3.02	.124
MEAN	2.74	.149
STANDARD DEVIATION	.92	1.886
SKEWNESS	-1.97	
KURTOSIS	6.62	

	FALL VELOCITY
16 PCT.	.75
50 PCT.	1.19
84 PCT.	2.83

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
191	28	82	29	7	0	0	0	CORE28	29 02.70N	095 09.10W

GALVESTON/CORE 28/000CM(TOP) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	1.24	1.24	11.52
1.00	.500	2.06	3.29	8.03
1.50	.354	2.41	5.70	5.41
2.00	.250	2.97	8.67	3.49
2.50	.177	5.74	14.41	2.12
3.00	.125	30.88	45.29	1.22
3.50	.088	54.71	100.00	.68
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.84
50 PCT.	1.16
84 PCT.	1.97

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.04	.122
MEAN	2.85	.139
STANDARD DEVIATION	.62	1.541
SKEWNESS	-2.18	
KURTOSIS	8.13	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
191	28	82	29	7	180	180	0	CORE28	29 02.70N	095 09.10W

GALVESTON/CORE 28/180CM(-5.9 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
.50	.707	0.00	0.00	
1.00	.500	.12	.12	8.03
1.50	.354	1.47	1.59	5.41
2.00	.250	2.64	4.24	3.49
2.50	.177	11.80	16.04	2.12
3.00	.125	38.24	54.28	1.22
3.50	.088	45.72	100.00	.68
4.00	.063	0.00	100.00	
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.87
50 PCT.	1.29
84 PCT.	2.12

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.96	.129
MEAN	2.88	.136
STANDARD DEVIATION	.44	1.355
SKEWNESS	-1.32	
KURTOSIS	5.18	

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN, 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	28	82	29	7	353	353	0	CORE28	29 02.70N	095 09.10W

GALVESTON/CORE 28/353CM(-11.5 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.89	.89	22.72
0.00	1.000	3.14	4.02	16.22
.50	.707	1.35	5.38	11.52
1.00	.500	.46	5.83	8.03
1.50	.354	1.14	6.97	5.41
2.00	.250	2.97	9.94	3.49
2.50	.177	14.29	24.23	2.12
3.00	.125	32.95	57.18	1.22
3.50	.088	38.88	96.06	.67
4.00	.063	3.94	100.00	.61
.LT. 4.00	.062	0.00	100.00	

16 PCT.				.83
50 PCT.				1.34
84 PCT.				2.78

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	2.91	.133
MEAN	2.70	.154
STANDARD DEVIATION	.84	1.788
SKEWNESS	-2.26	
KURTOSIS	8.45	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	28	82	29	7	403	403	0	CORE28	29 02.70N	095 09.10W

GALVESTON/CORE 28/403CM(-13.2 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-1.00	2.000	0.00	0.00	
-.50	1.414	.31	.31	22.72
0.00	1.000	4.00	4.31	16.22
.50	.707	1.36	5.67	11.52
1.00	.500	3.74	9.41	8.03
1.50	.354	1.84	11.25	5.41
2.00	.250	2.99	14.23	3.49
2.50	.177	6.42	20.66	2.12
3.00	.125	17.66	38.31	1.22
3.50	.088	34.99	73.30	.67
4.00	.063	26.70	100.00	.40
.LT. 4.00	.062	0.00	100.00	

16 PCT.				.54
50 PCT.				.98
84 PCT.				2.08

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.17	.111
MEAN	2.87	.137
STANDARD DEVIATION	1.03	2.038
SKEWNESS	-1.74	
KURTOSIS	5.48	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	33	82	29	8	200	200	0	CORE33	28 56.20N	095 15.80W

GALVESTON/CORE 33/200CM(-6.5 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.15	.15	11.52
1.00	.500	1.37	1.52	8.03
1.50	.354	1.67	3.19	5.41
2.00	.250	2.15	5.34	3.49
2.50	.177	9.50	14.84	2.12
3.00	.125	30.27	45.10	1.22
3.50	.088	48.56	93.66	.67
4.00	.063	6.34	100.00	.61
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.76
50 PCT.				1.15
84 PCT.				2.00

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.05	.121
MEAN	2.94	.130
STANDARD DEVIATION	.54	1.450
SKEWNESS	-1.88	
KURTOSIS	7.90	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	34	82	29	7	20	20	0	CORE34	28 56.60N	095 16.50W

GALVESTON/CORE 34/020CM(-0.6 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	1.63	1.63	16.22
.50	.707	1.75	3.38	11.52
1.00	.500	1.93	5.31	8.03
1.50	.354	1.89	7.19	5.41
2.00	.250	2.04	9.24	3.49
2.50	.177	2.93	12.17	2.12
3.00	.125	18.26	30.43	1.22
3.50	.088	37.98	68.41	.67
4.00	.063	31.59	100.00	.43
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.54
50 PCT.				.84
84 PCT.				1.81

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.31	.101
MEAN	3.06	.120
STANDARD DEVIATION	.85	1.804
SKEWNESS	-2.21	
KURTOSIS	7.96	

GALVESTON, TEXAS - JEFF WILLIAMS   PART 2 OF 2   CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	34	82	29	7	20	20	0	CORE34	28 56.60N	095 16.50W

GALVESTON/CORE 34/020CM(-0.6 FT)   07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	1.51	1.51	16.22
.50	.707	3.59	5.10	11.52
1.00	.500	1.05	6.15	8.03
1.50	.354	1.42	7.57	5.41
2.00	.250	1.99	9.56	3.49
2.50	.177	6.89	16.45	2.12
3.00	.125	15.33	31.79	1.22
3.50	.088	34.49	66.27	.67
4.00	.063	33.73	100.00	.43
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.53
50 PCT.				.84
84 PCT.				2.15

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.30	.101
MEAN	3.03	.123
STANDARD DEVIATION	.90	1.863
SKEWNESS	-2.04	
KURTOSIS	6.94	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	34	82	29	7	100	100	0	CORE34	28 56.60N	095 16.50W

GALVESTON/CORE 34/100CM(-3.2 FT)   07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	.42	.42	11.52
1.00	.500	1.02	1.44	8.03
1.50	.354	1.36	2.81	5.41
2.00	.250	1.56	4.37	3.49
2.50	.177	4.63	9.00	2.12
3.00	.125	14.11	23.10	1.22
3.50	.088	34.53	57.63	.67
4.00	.063	42.37	100.00	.40
.LT. 4.00	.062	0.00	100.00	
16 PCT.				.48
50 PCT.				.74
84 PCT.				1.50

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.41	.094
MEAN	3.26	.104
STANDARD DEVIATION	.61	1.523
SKEWNESS	-2.01	
KURTOSIS	8.31	

GALVESTON, TEXAS - JEFF WILLIAMS PART 2 OF 2 CN. 0018-0034

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	34	82	29	7	200	200	0	CORE34	28 56.60N	095 16.50W

GALVESTON/CORE 34/200CM(-6.5 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
-.50	1.414	0.00	0.00	
0.00	1.000	1.55	1.55	16.22
.50	.707	2.14	3.69	11.52
1.00	.500	1.29	4.97	8.03
1.50	.354	1.33	6.30	5.41
2.00	.250	1.55	7.85	3.49
2.50	.177	3.23	11.08	2.12
3.00	.125	14.95	26.03	1.22
3.50	.088	38.92	64.95	.67
4.00	.063	35.05	100.00	.43
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.52
50 PCT.	.83
84 PCT.	1.64

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.33	.099
MEAN	3.11	.116
STANDARD DEVIATION	.82	1.766
SKEWNESS	-2.39	
KURTOSIS	8.89	

REFERENCE NUMBER	CONSECUTIVE NUMBER	MARSDEN SQUARE	1 DG. SQUARE	DEPTH ZONE	CORE TOP	CORE BOTTOM(CM)	ANALYSIS CODE	SAMPLE ID	LATITUDE	LONGITUDE
151	34	82	29	7	270	270	0	CORE34	28 56.60N	095 16.50W

GALVESTON/CORE 34/270CM(-8.8 FT) 07-13-77

PHI SIZE	MM. SIZE	FREQUENCY PERCENT	CUMULATIVE PERCENT	FALL VELOCITY
0.00	1.000	0.00	0.00	
.50	.707	1.10	1.10	11.52
1.00	.500	.45	1.56	8.03
1.50	.354	1.26	2.81	5.41
2.00	.250	3.57	6.38	3.44
2.50	.177	7.85	14.23	2.12
3.00	.125	15.57	29.79	1.22
3.50	.088	34.57	64.36	.67
4.00	.063	35.64	100.00	.40
.LT. 4.00	.062	0.00	100.00	

	FALL VELOCITY
16 PCT.	.51
50 PCT.	.85
84 PCT.	1.92

STATISTICAL PARAMETERS

	PHI	MM.
MEDIAN	3.31	.101
MEAN	3.15	.113
STANDARD DEVIATION	.66	1.582
SKEWNESS	-1.63	
KURTOSIS	6.36	

CERC SEDIMENT ANALYSIS

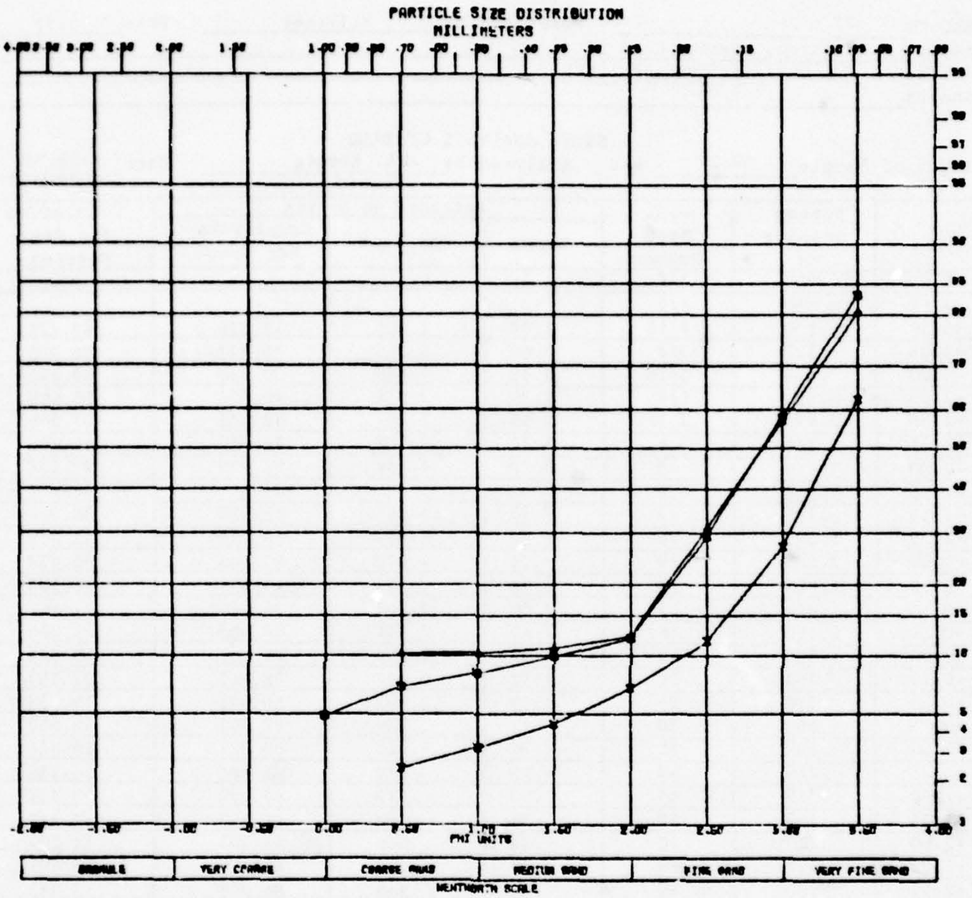
CERC CN 27 Collected by S.J. Williams Date 7-13-77
Project Galveston, Texas - Core 27
Location/Sample No. -127 cm (-4.1 ft)
Remarks

SIEVE ANALYSIS OF SAND

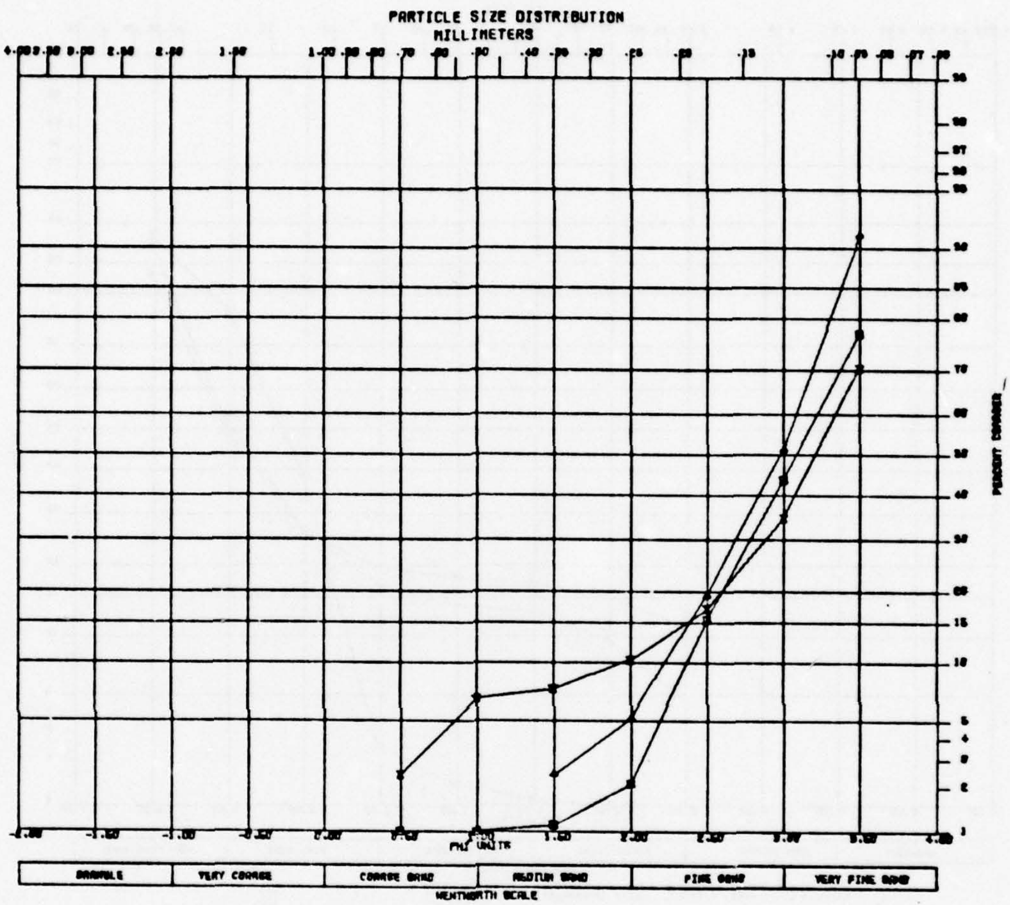
Weight of Sample 69.39 gr. Analyzed by M.L. Koenig Date 1-24-77

ϕ	Screen Opening MM	U.S. Mesh Number	Retained on Sieves: Grams	Per Cent	Cumulative Per Cent	Cumulative Per Cent Passing
-4.00	16.000	5/8				
-3.68	13.550	1/2				
-3.50	11.100	7/16	1.94	2.805	17.826	82.175
-3.25	9.520	3/8	3.60	5.205	23.031	76.970
-3.00	7.930	5/16	5.18	7.489	30.520	69.481
-2.65	6.350	1/4	6.79	9.816	40.336	59.665
-2.50	5.613	3 1/2	1.59	2.299	42.635	57.366
-2.25	4.760	4	3.72	5.378	48.013	51.988
-2.00	3.962	5	3.29	4.756	52.769	47.232
-1.75	3.360	6	---	---	---	---
-1.50	2.794	7	7.10	10.265	63.034	36.967
-1.25	2.362	8	2.60	3.759	66.793	33.208
-1.00	2.000	10	.74	1.070	67.863	32.138
-0.75	1.700	12	1.38	1.995	69.858	30.143
-0.50	1.400	14	2.00	2.891	72.749	27.252
-0.25	1.180	16	1.49	2.154	74.903	25.098
0.00	1.000	18	1.22	1.764	76.667	23.334
+0.25	.850	20	1.52	2.197	78.864	21.137
+0.50	.710	25	1.25	1.807	80.671	19.330
+0.75	.600	30	.92	1.330	82.001	18.000
+1.00	.500	35	.71	1.026	83.027	16.974
+1.25	.425	40	.58	.839	83.866	16.135
+1.50	.355	45	.50	.723	84.589	15.412
+1.75	.300	50	.39	.564	85.153	14.848
+2.00	.250	60	.38	.549	85.702	14.299
+2.25	.212	70	.49	.708	86.410	13.591
+2.50	.180	80	.38	.549	86.959	13.042
+2.75	.150	100	2.40	3.470	90.429	9.572
+3.00	.125	120	1.88	2.718	93.147	6.854
+3.25	.106	140	1.82	2.631	95.778	4.223
+3.50	.090	170	1.72	2.487	98.265	1.736
+3.75	.075	200	.78	1.128	99.393	.608
+4.00	.063	230	.10	.145	99.538	.463
	0.000	Pan	.32	.463	100.001	.000
	Totals		69.17	100.001		
	Gain or loss		-.22			

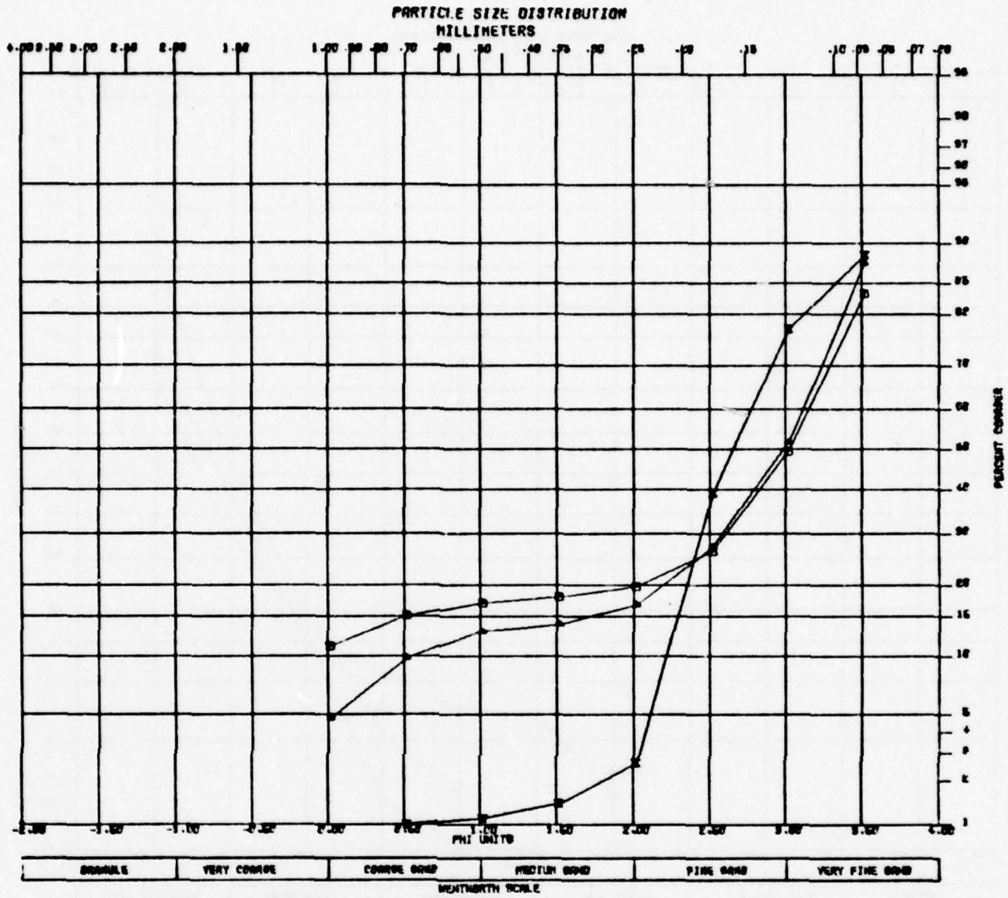
Mean diameter: 4.16 mm (-2.06 phi)
Phi standard deviation: 2.35



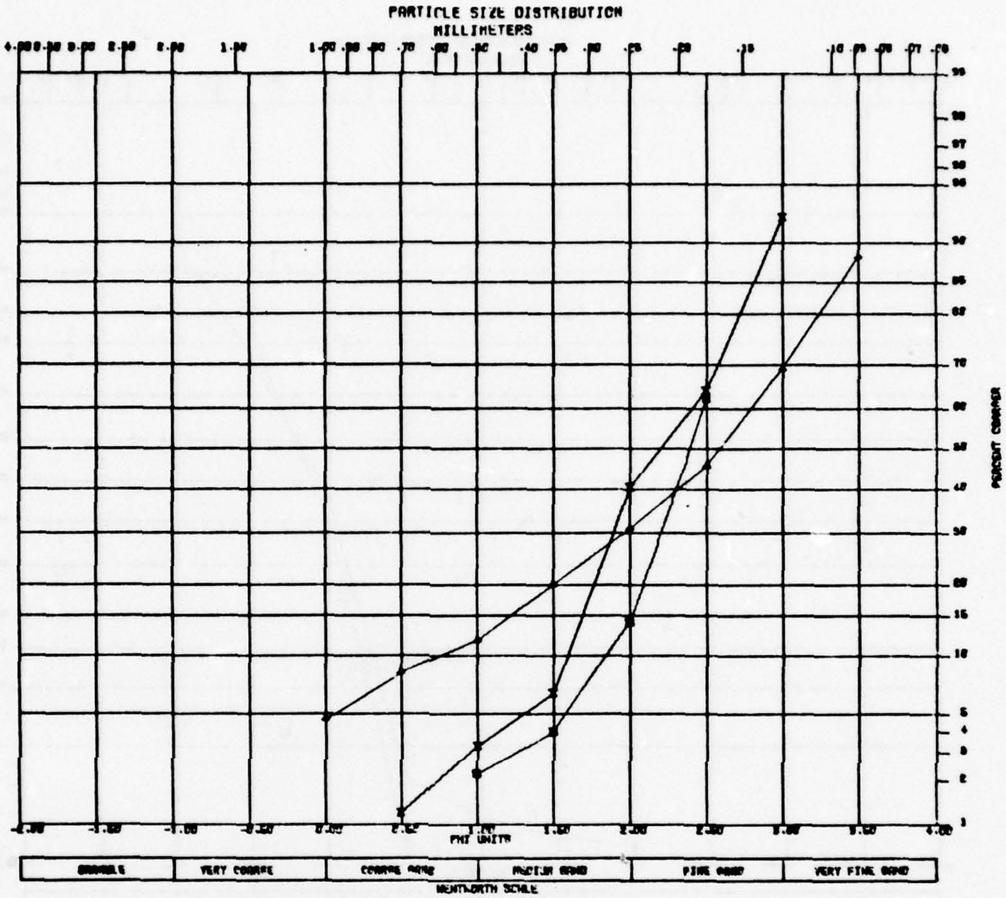
GALVESTON/CORE 03/000CM(TOP) □
GALVESTON/CORE 03/000CM(TOP) △
GALVESTON/CORE 03/030CM(-1.1 FT) X



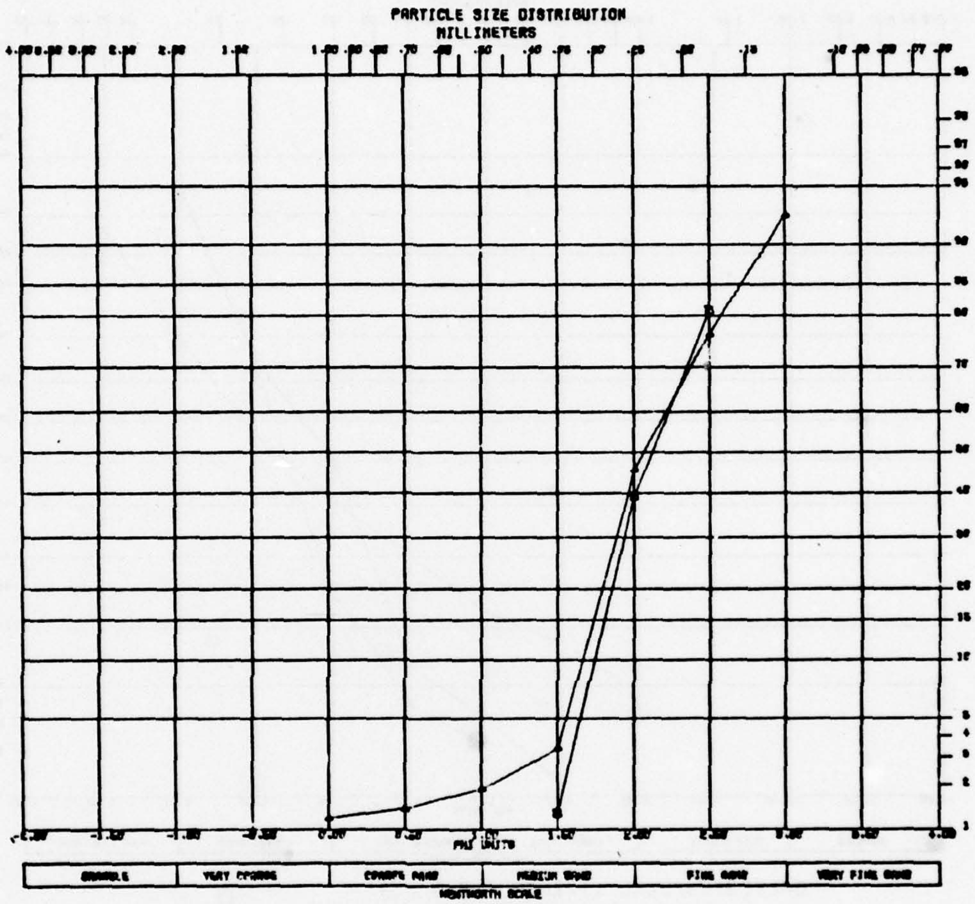
GALVESTON/CORE 03/090CM(-3.0 FT) □
GALVESTON/CORE 03/200CM(-6.6 FT) △
GALVESTON/CORE 03/235CM(-7.7 FT BTM) ⧗



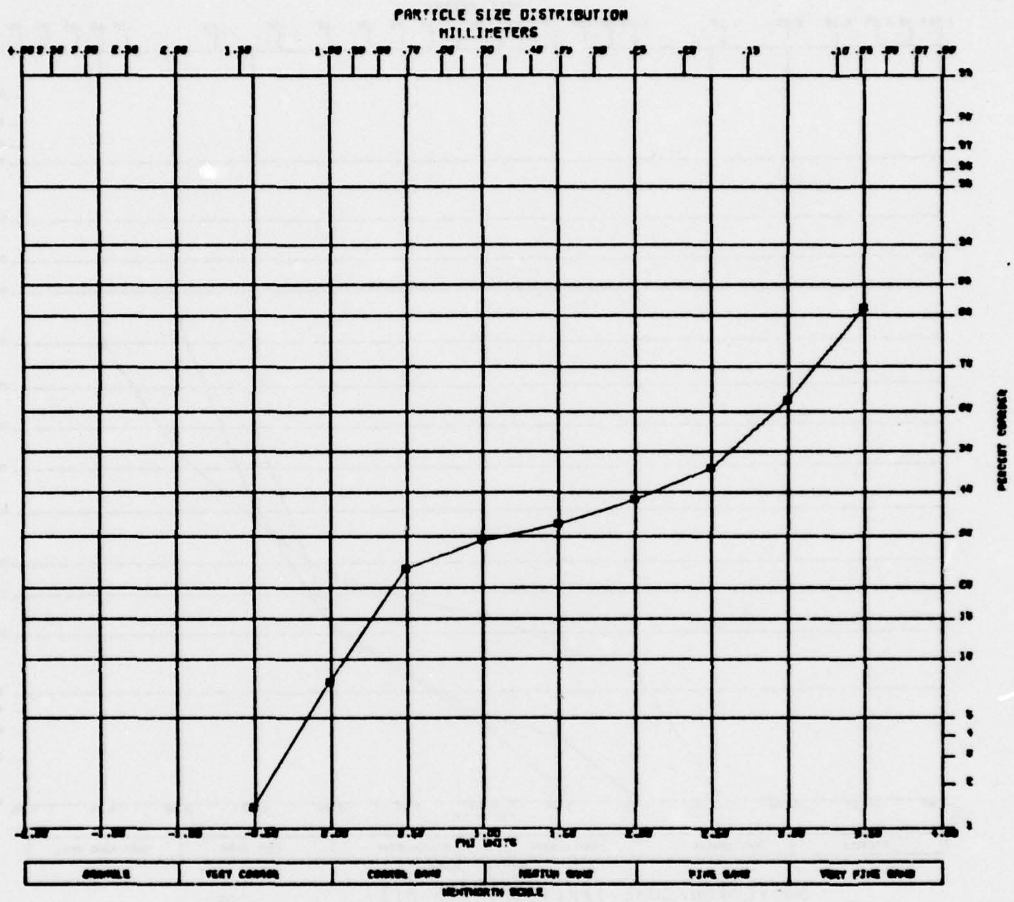
GALVESTON/CORE 05/340CM(-11.2 FT) □
GALVESTON/CORE 05/340CM(-11.2 FT) △
GALVESTON/CORE 11/140CM(-4.5 FT) ⧖



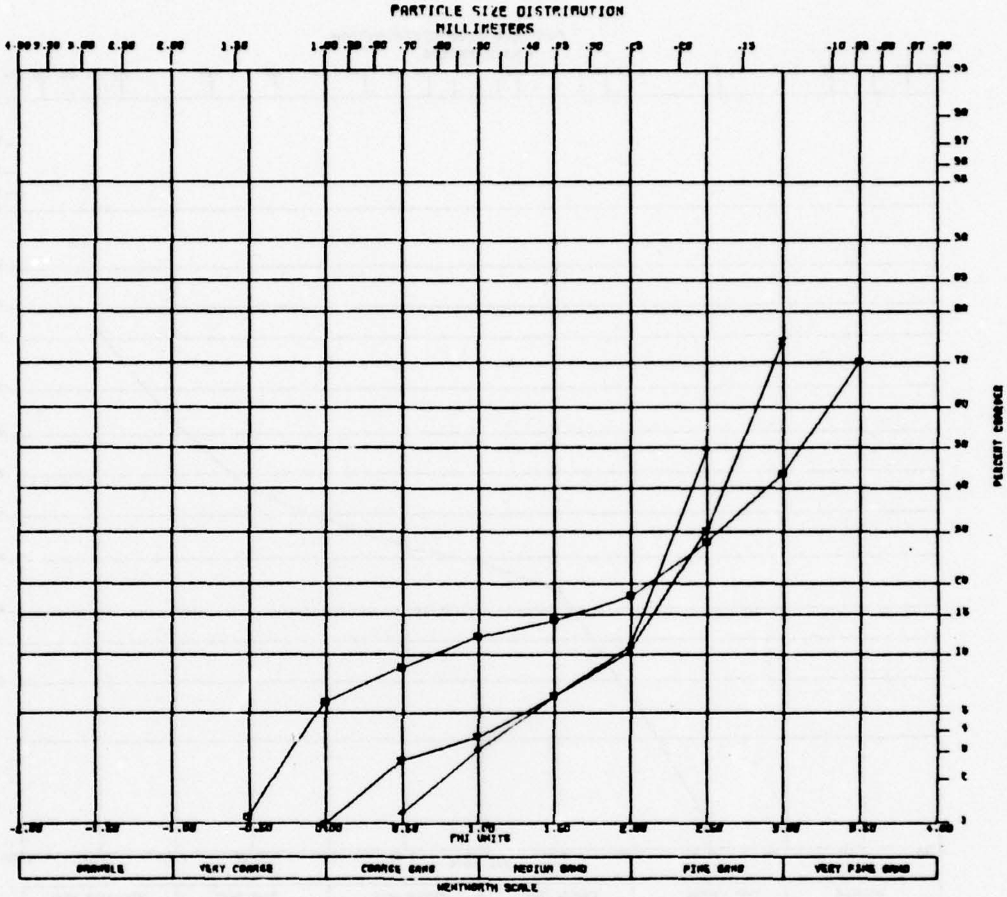
GALVESTON/CORE 11/200CM(-6.5 FT) □
GALVESTON/CORE 11/240CM(-7.8 FT) △
GALVESTON/CORE 11/250CM(-8.2 FT) ⧗



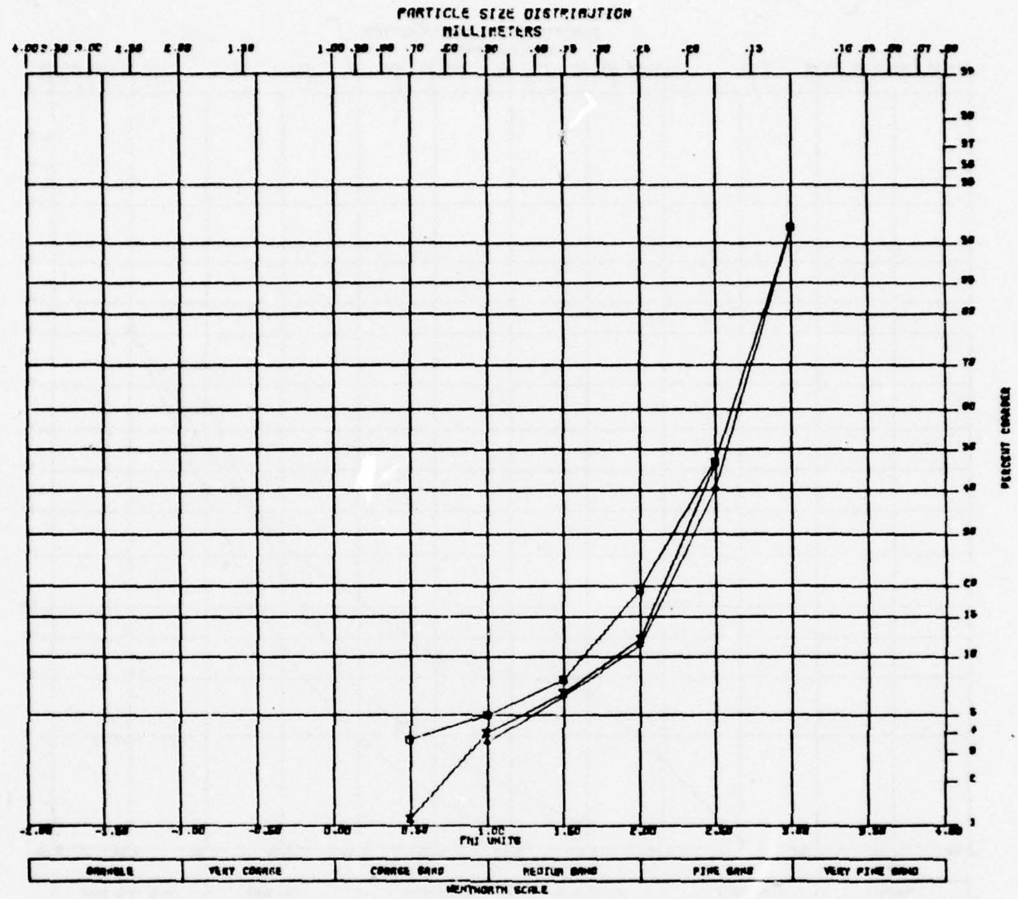
GALVESTON/CORE 11/270CM(-8.8 FT) □
GALVESTON/CORE 11/270CM(-8.8 FT) ▲



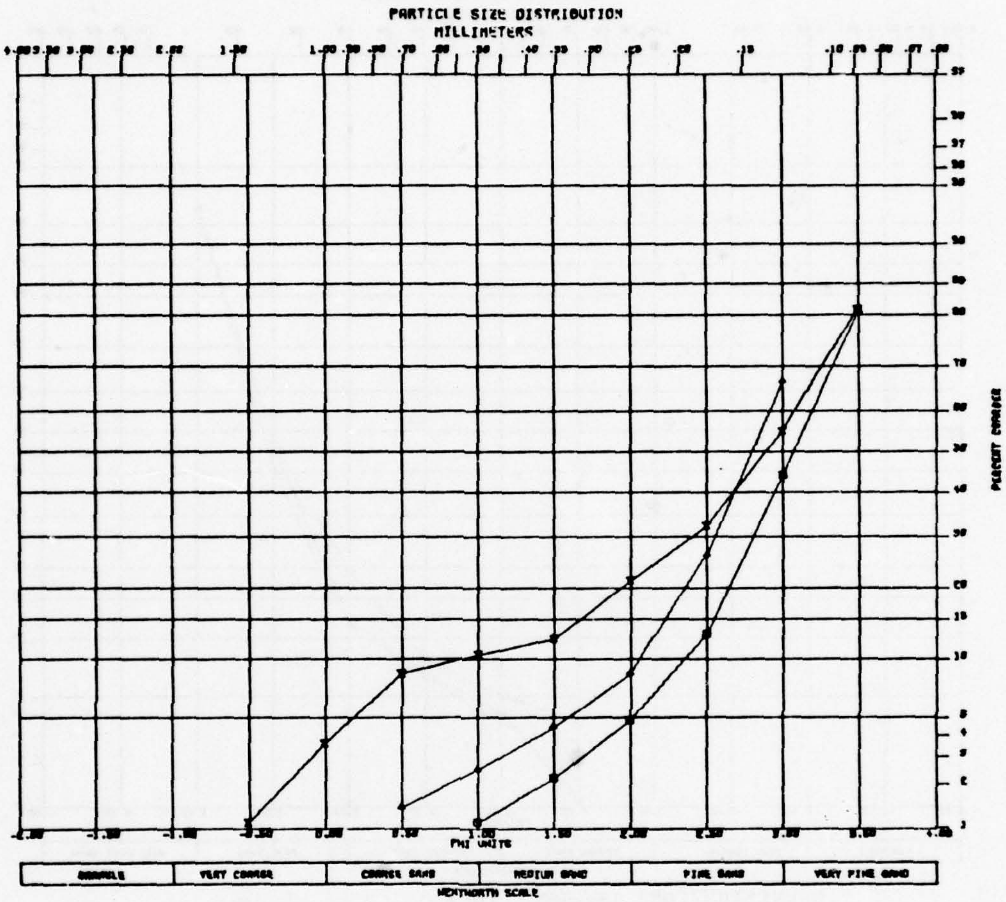
GALVESTON/CORE 12/115CM(-3.7 FT)



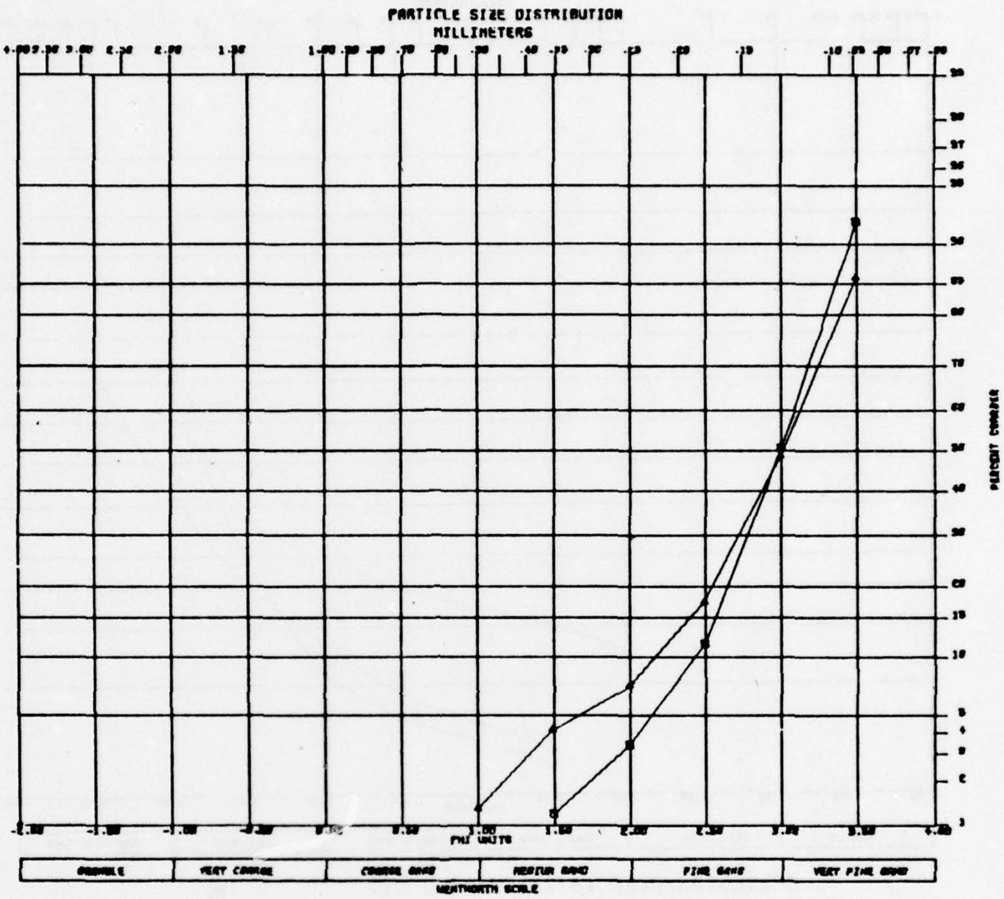
GALVESTON/CORE 12/140CM(-4.5 FT) ▢
GALVESTON/CORE 12/240CM(-7.8 FT) △
GALVESTON/CORE 12/440CM(-14.4 FT) X



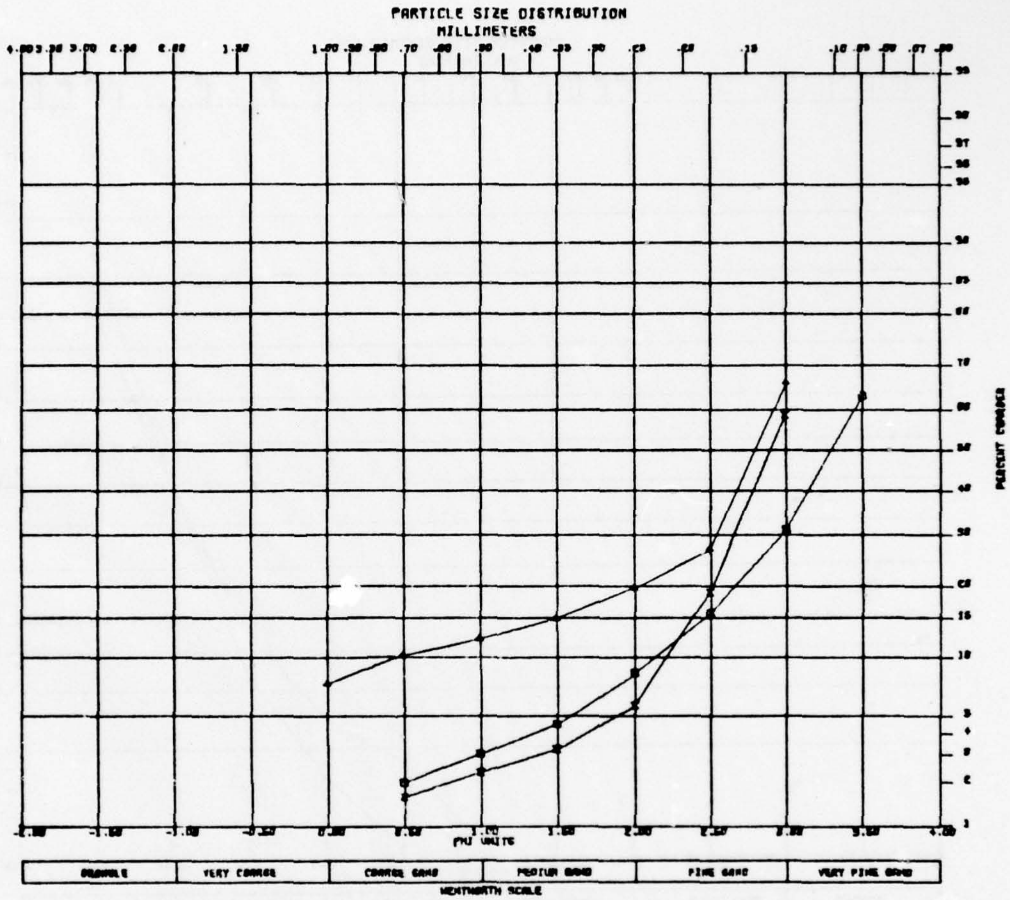
GALVESTON/CORE 14/000CM(TOP) □
GALVESTON/CORE 14/000CM(TOP) △
GALVESTON/CORE 14/062CM(-2.0 FT) ⧗



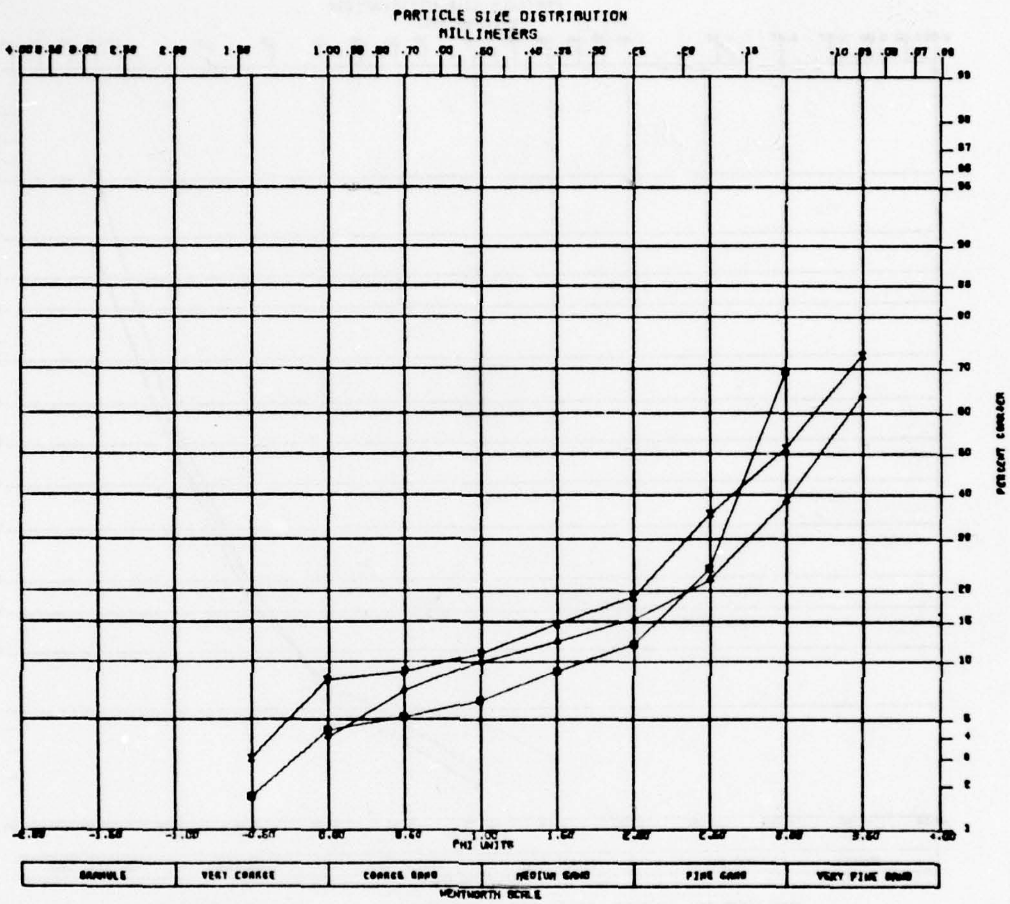
GALVESTON/CORE 14/094CM(-3.0 FT) □
GALVESTON/CORE 14/124CM(-4.0 FT) △
GALVESTON/CORE 14/190CM(-6.2 FT) X



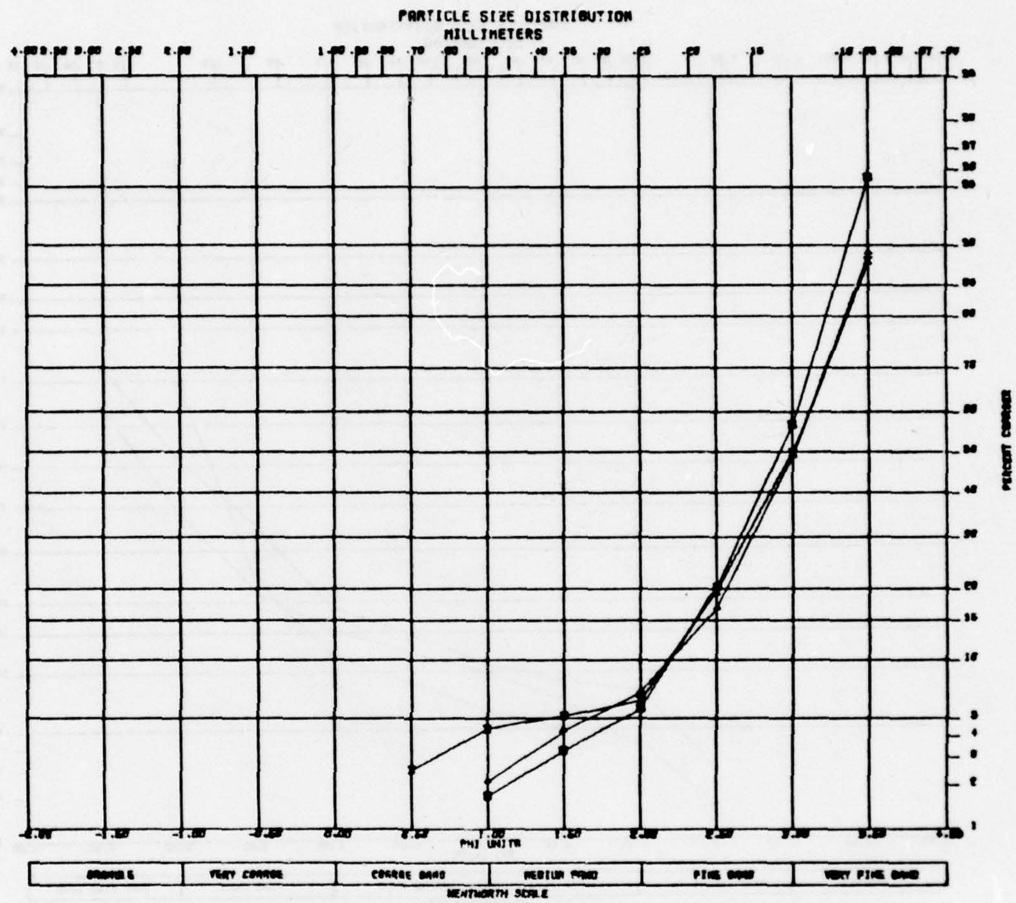
GALVESTON/CORE 15/040CM(-1.3 FT)
GALVESTON/CORE 15/040CM(-1.3 FT)



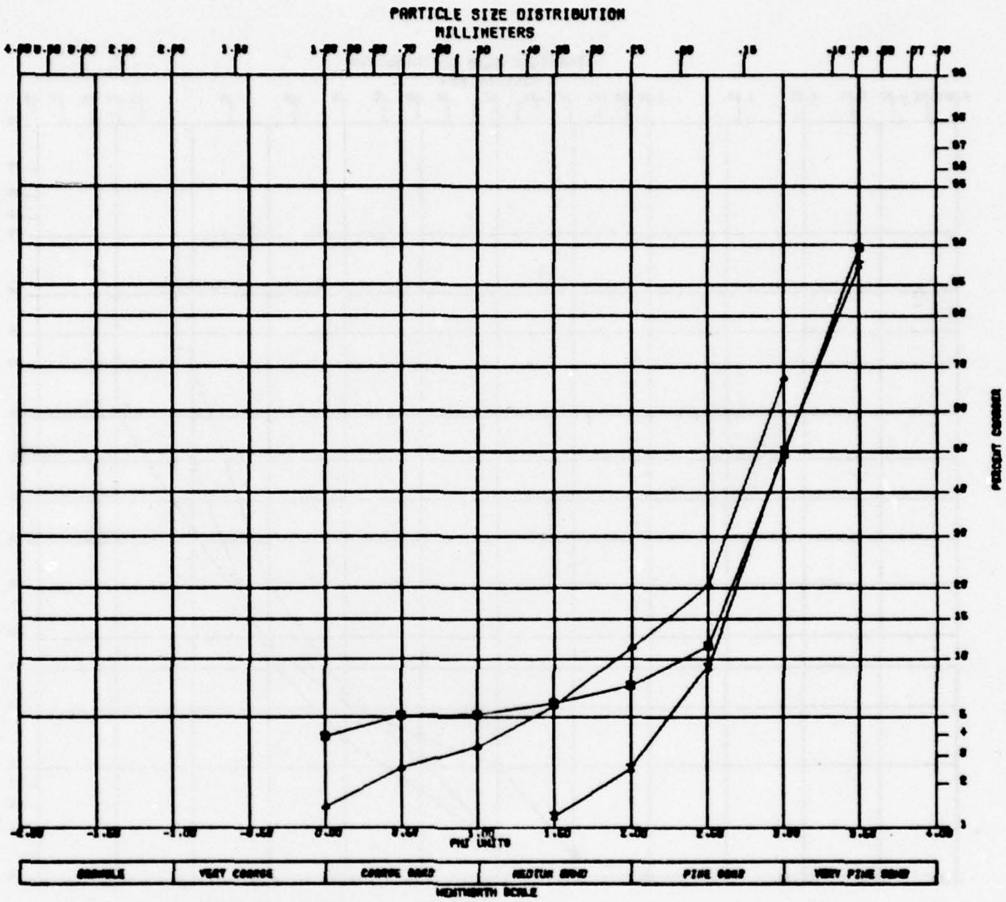
GALVESTON/CORE 15/213CM(-6.9 FT)
GALVESTON/CORE 15/230CM(-7.5 FT)
GALVESTON/CORE 15/262CM(-8.6 FT BTM)



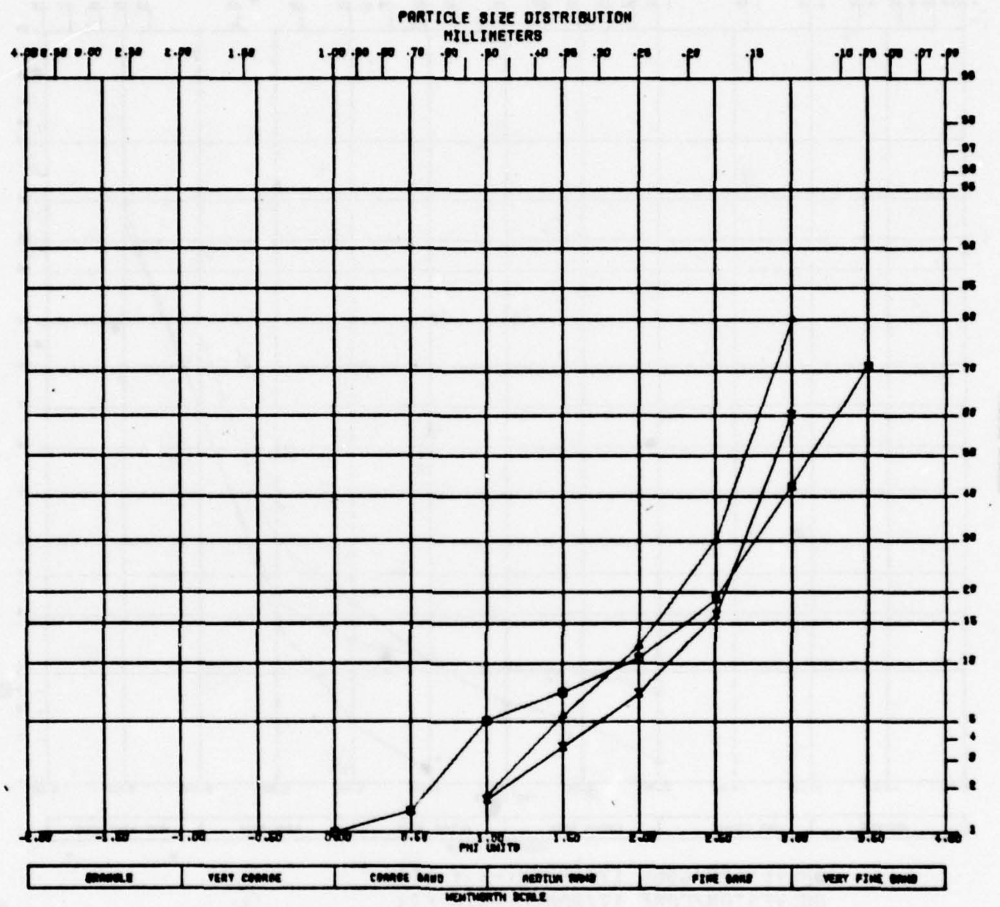
GALVESTON/CORE 16/056CM(-1.8 FT)
GALVESTON/CORE 16/155CM(-5.0 FT)
GALVESTON/CORE 16/155CM(-5.0 FT)



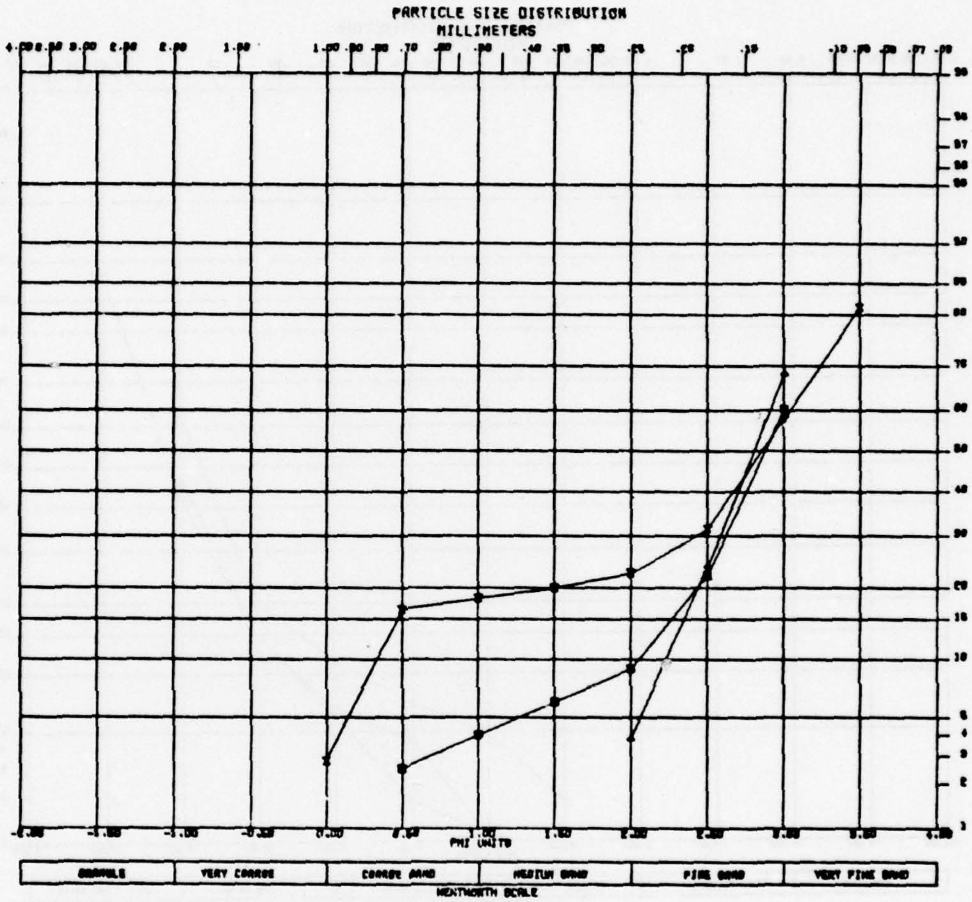
GALVESTON/CORE 17/070CM(-2.2 FT)
GALVESTON/CORE 17/080CM(-2.8 FT)
GALVESTON/CORE 17/100CM(-3.2 FT)



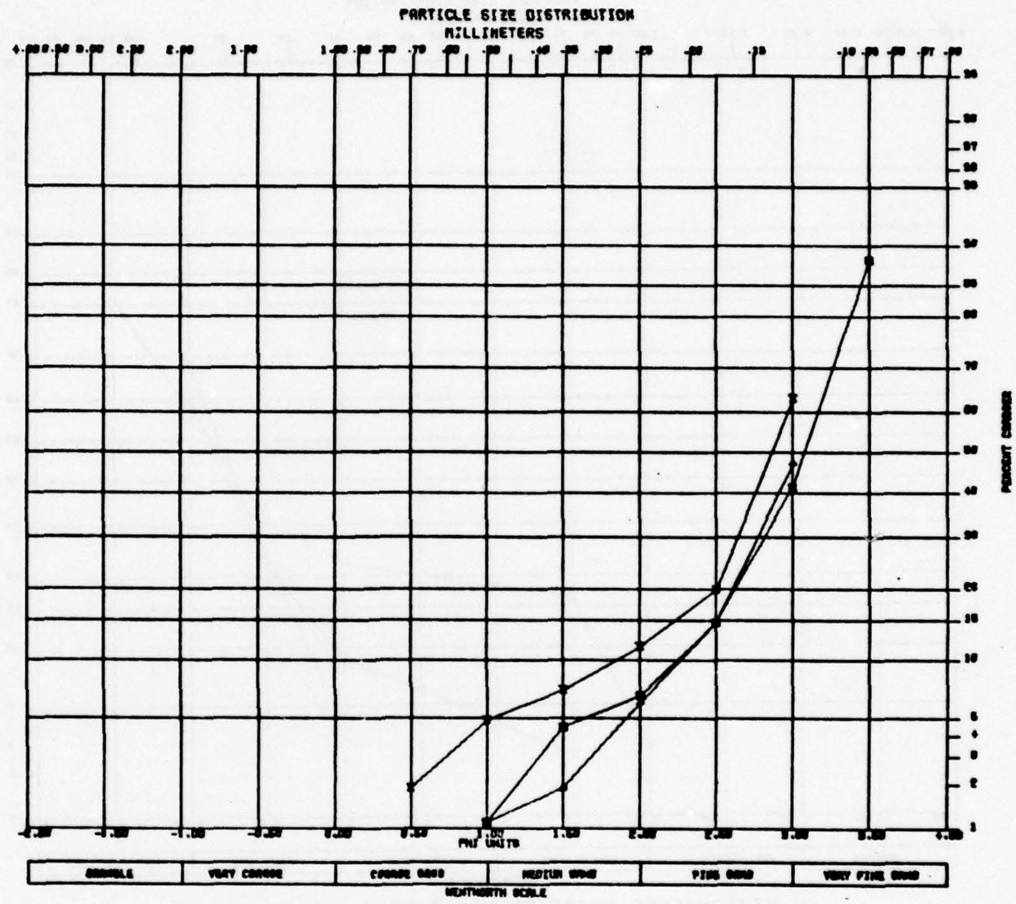
GALVESTON/CORE 17/150CM(-4.9 FT)
GALVESTON/CORE 17/200CM(-6.5 FT)
GALVESTON/CORE 17/200CM(-6.5 FT)



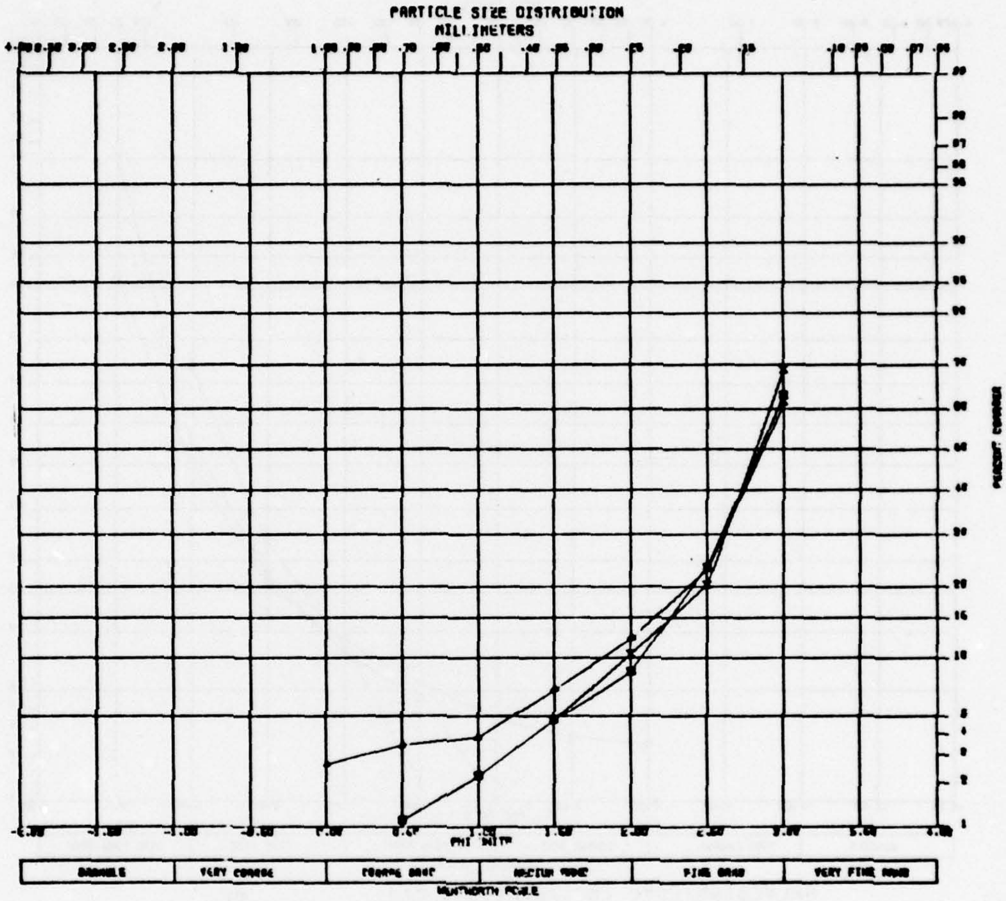
GALVESTON/CORE 17/235CM(-7.7 FT)
GALVESTON/CORE 17/270CM(-8.8 FT)
GALVESTON/CORE 17/323CM(-10.5 FT)



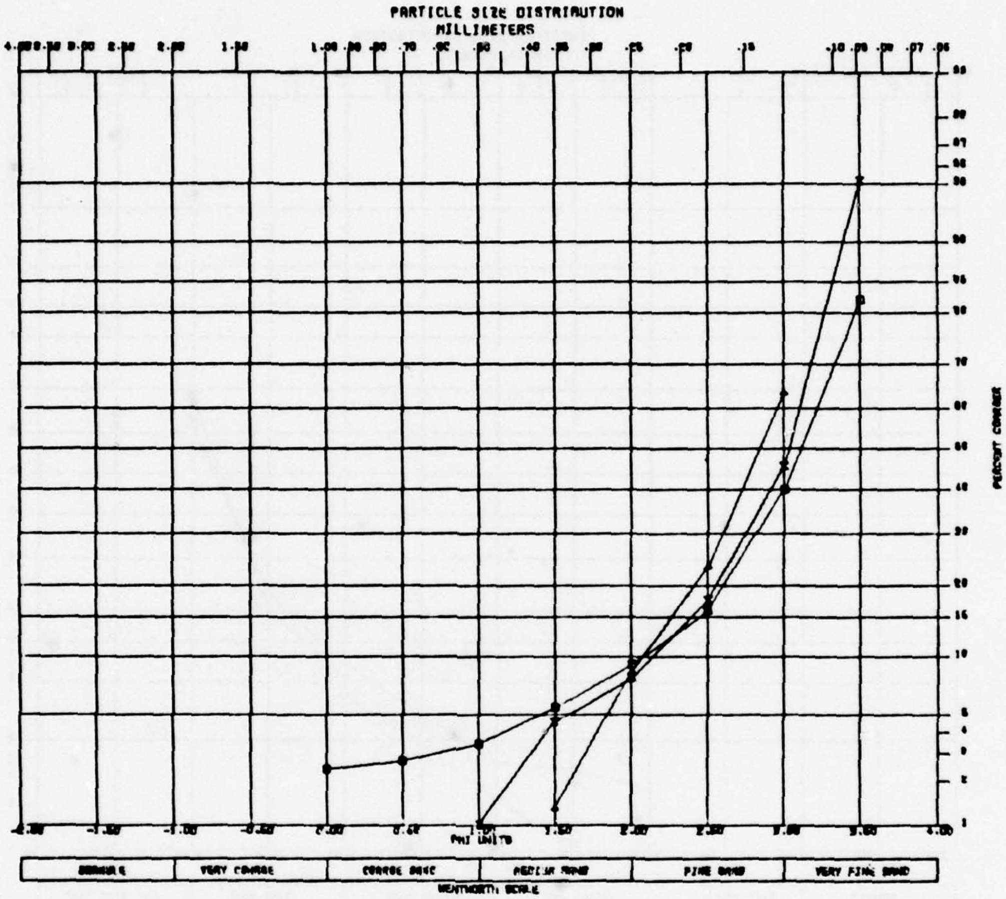
GALVESTON/CORE 17/354CM(-11.6 FT) □
GALVESTON/CORE 17/390CM(-12.7 FT) △
GALVESTON/CORE 17/390CM(-12.7 FT) X



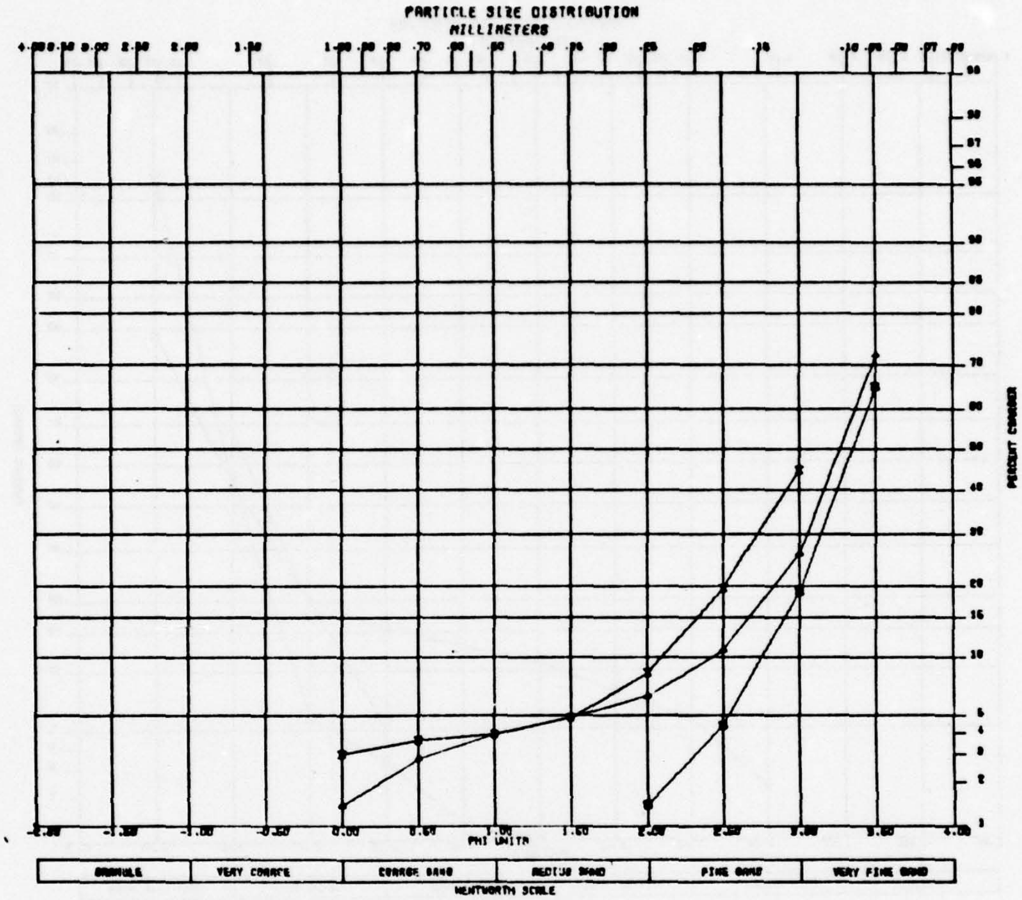
GALVESTON/CORE 17/458CM(-15.0 FT)
GALVESTON/CORE 17/500CM(-16.4 FT)
GALVESTON/CORE 17/570CM(-18.7 FT)



GALVESTON/CORE 18/000CM(TOP)
GALVESTON/CORE 18/070CM(-2.2 FT)
GALVESTON/CORE 18/070CM(-2.2 FT)



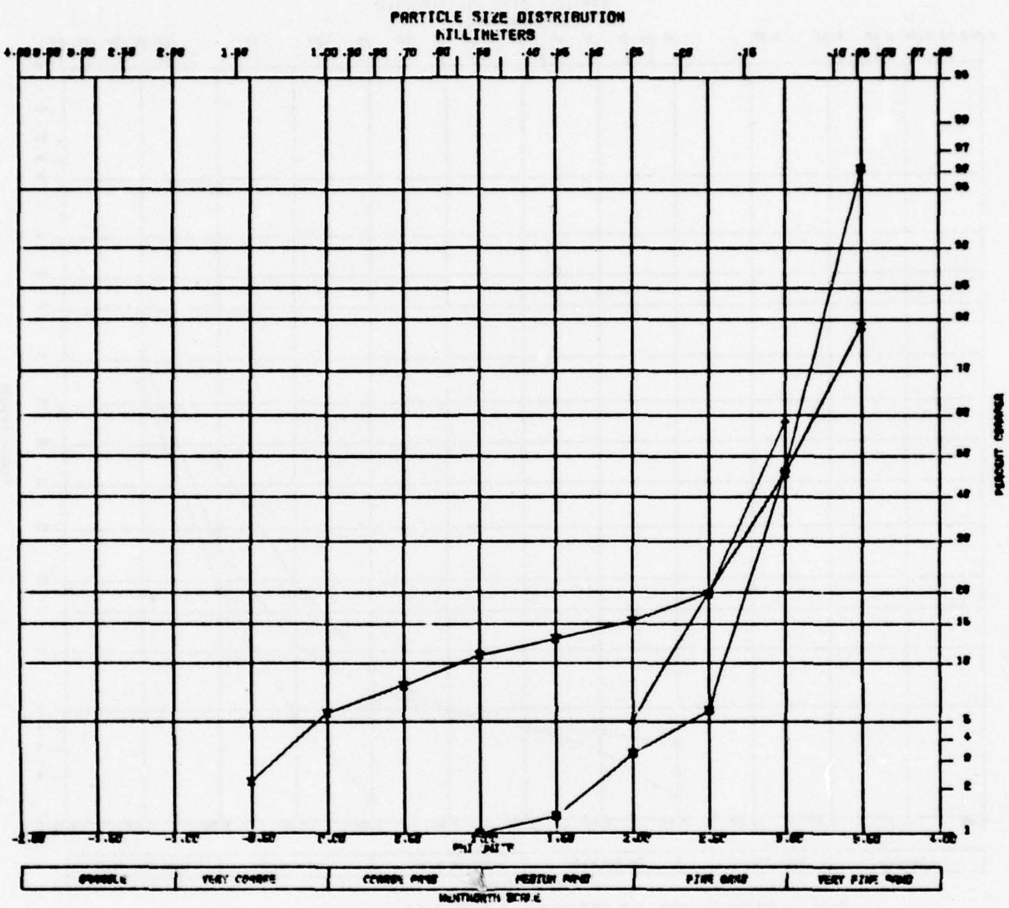
GALVESTON/CORE 18/120CM(-3.9 FT)
GALVESTON/CORE 18/220CM(-7.2 FT)
GALVESTON/CORE 18/310CM(-10.1 FT)



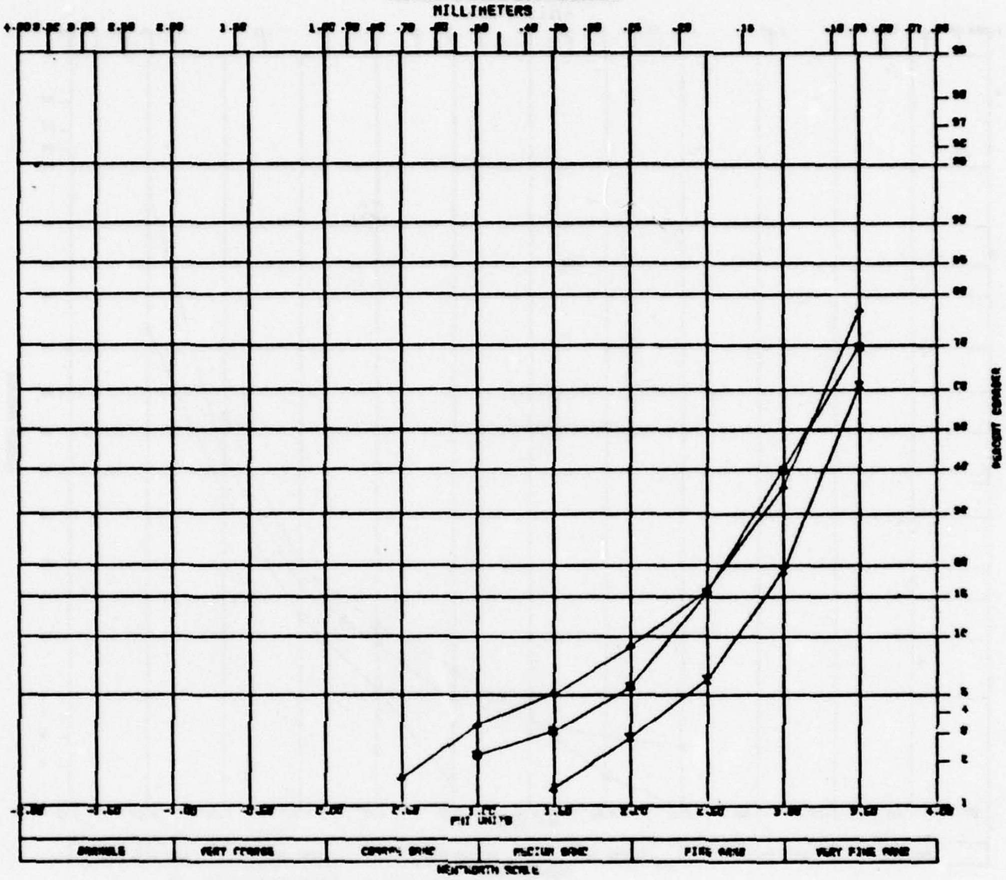
GALVESTON/CORE 18/365CM(-11.9 FT) □

GALVESTON/CORE 18/396CM(-12.9 FT) △

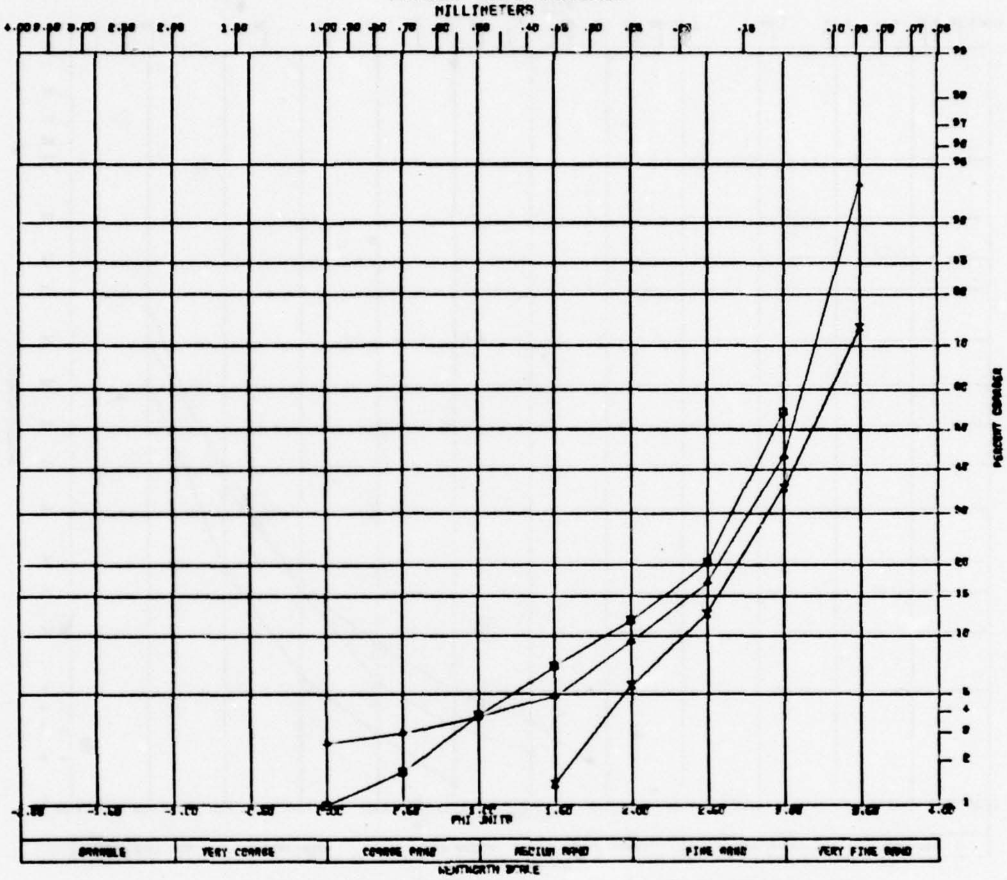
GALVESTON/CORE 18/396cm(-12.9 FT) X



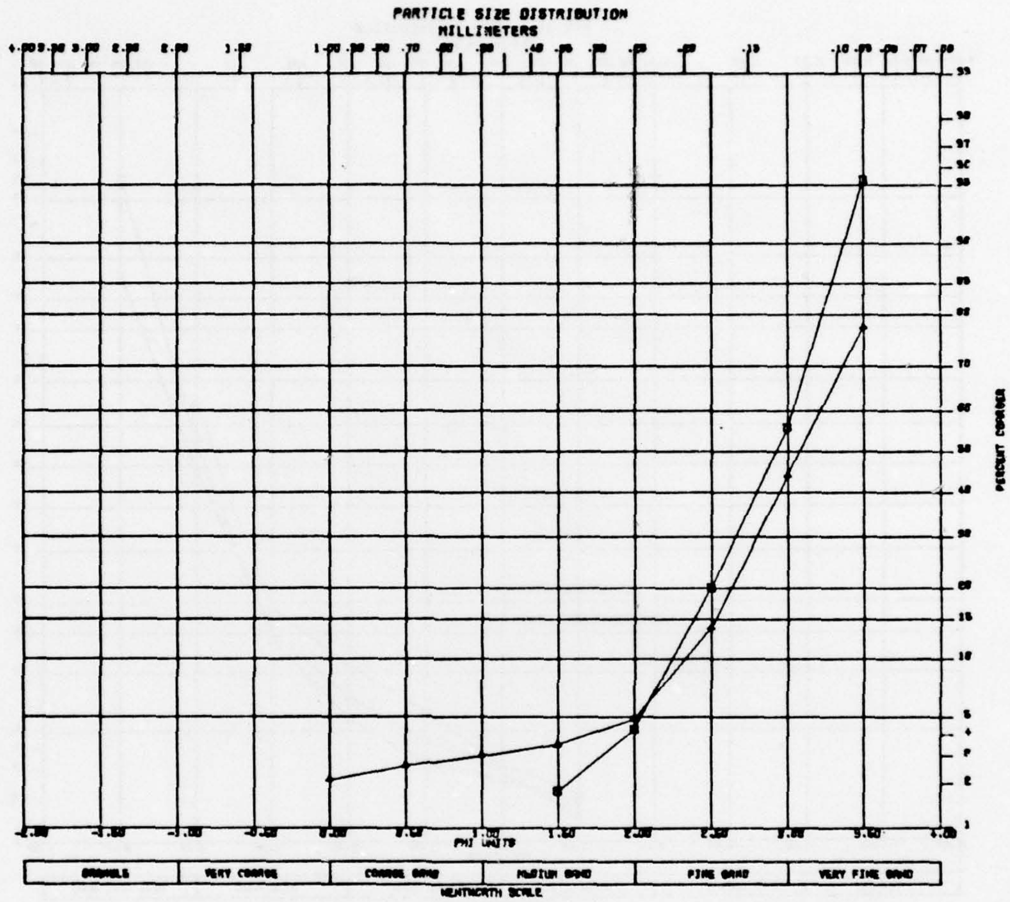
GALVESTON/CORE 21/125CM(-4.1 FT) □
GALVESTON/CORE 21/125CM(-4.1 FT) △
GALVESTON/CORE 21/200CM(-6.5 FT) ⧗



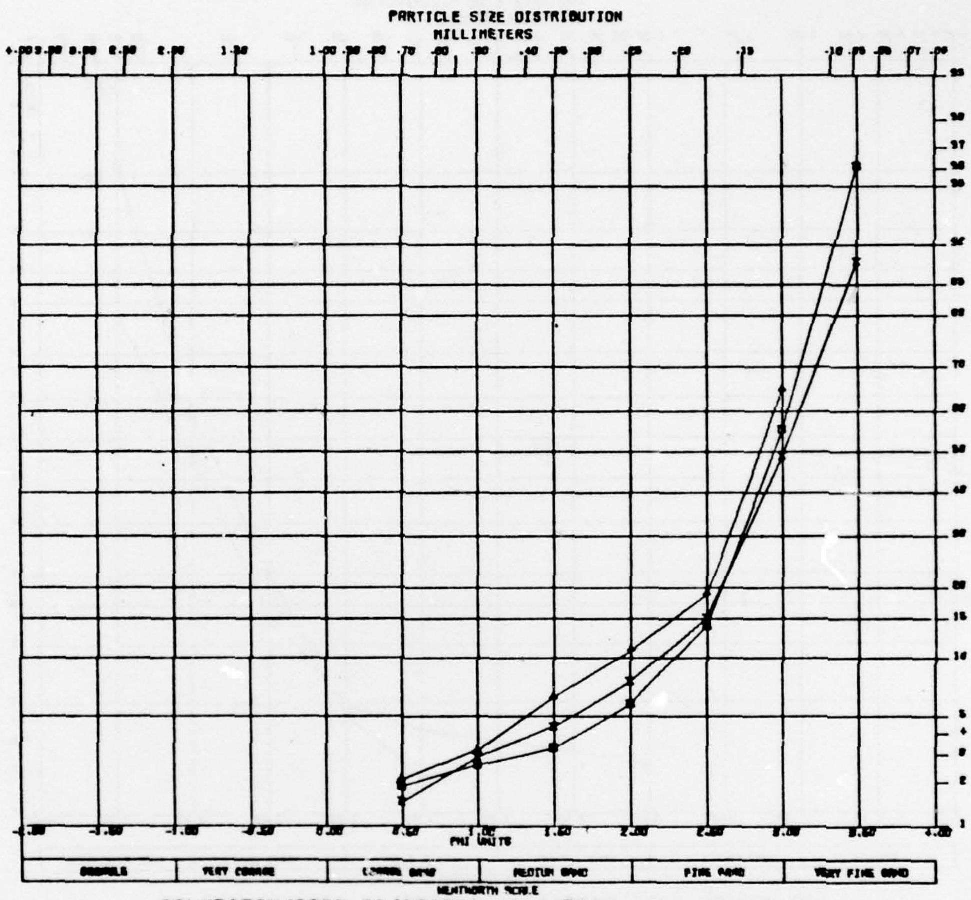
GALVESTON/CORE 19/210CM(-6.8 FT) □
GALVESTON/CORE 23/098CM(-3.2 FT) △
GALVESTON/CORE 23/098CM(-3.2 FT) ⧗



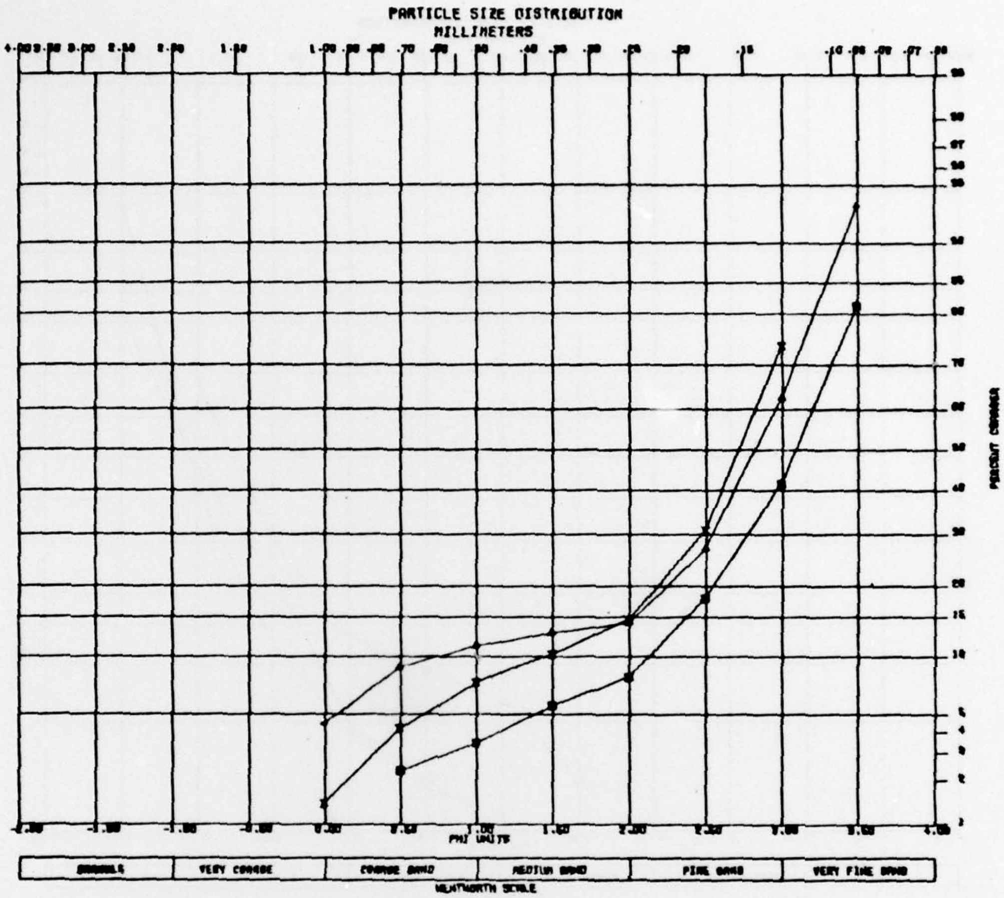
GALVESTON/CORE 21/000CM(TOP) ◻
GALVESTON/CORE 21/050CM(-1.6 FT) △
GALVESTON/CORE 21/080CM(-2.6 FT) ⧗



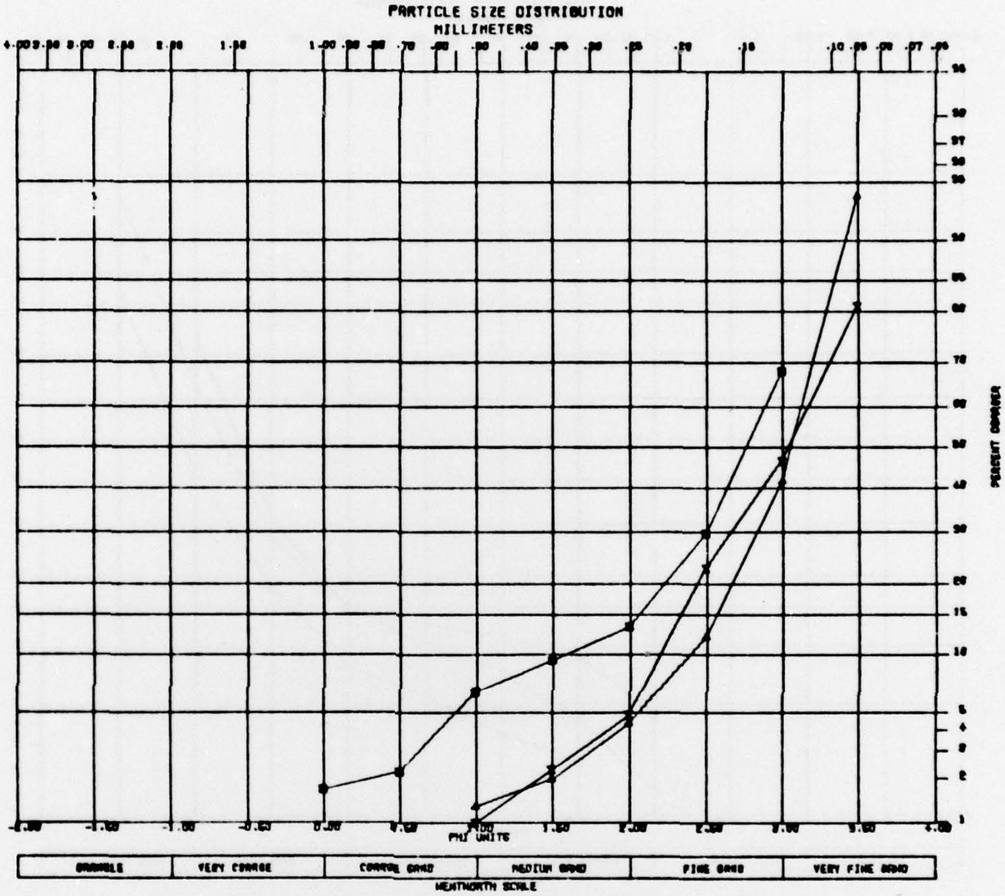
GALVESTON/CORE 23/300CM(-9.8 FT) □
GALVESTON/CORE 23/380CM(-12.4 FT) △



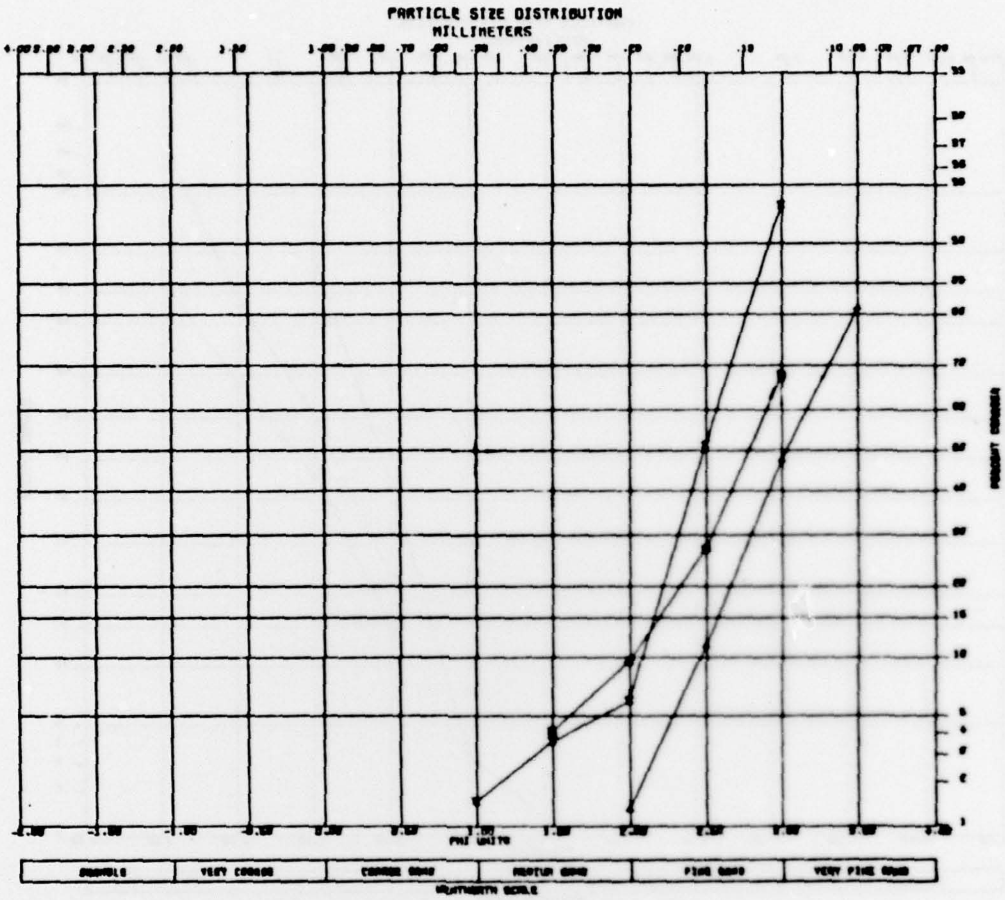
GALVESTON/CORE 21/350CM(-11.4 FT)
GALVESTON/CORE 22/140CM(-4.5 FT)
GALVESTON/CORE 22/180CM(-5.9 FT)



GALVESTON/CORE 24/000CM(TOP)
GALVESTON/CORE 24/045CM(-1.4 FT)
GALVESTON/CORE 24/045CM(-1.4 FT)



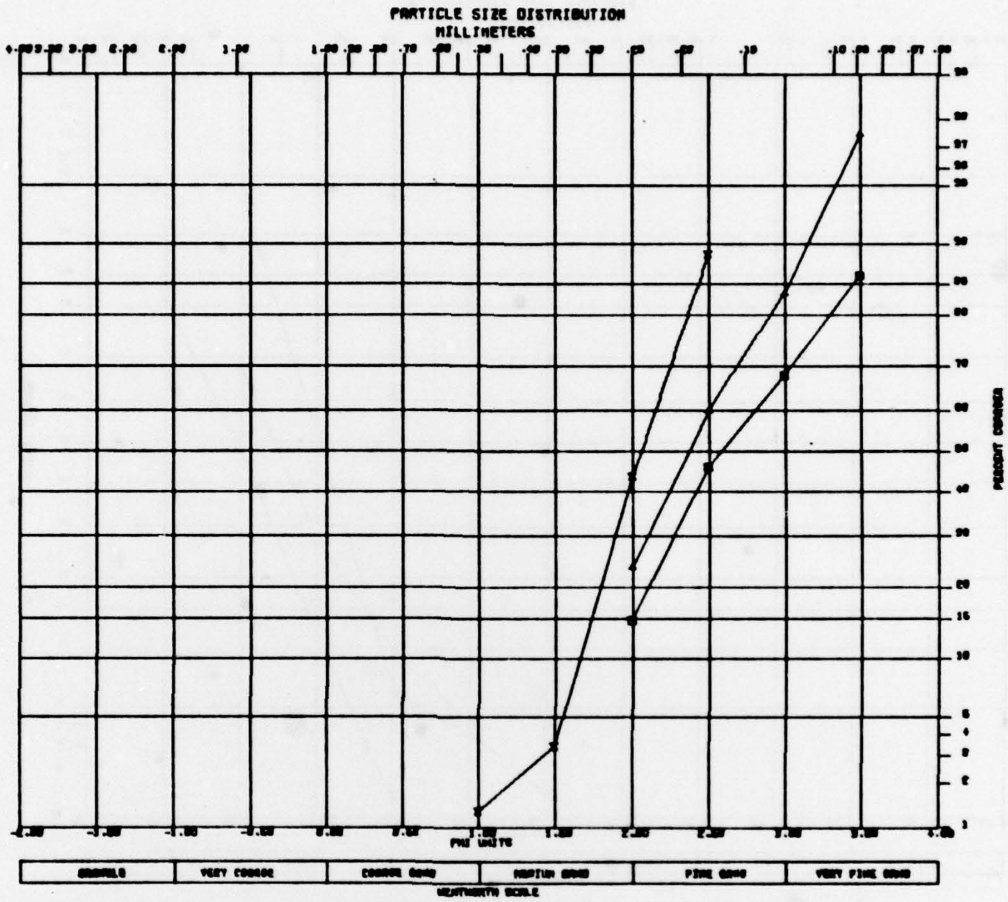
GALVESTON/CORE 23/469CM(-15.4 FT BTM) □
GALVESTON/CORE 25/120CM(-3.9 FT) △
GALVESTON/CORE 25/148CM(-4.8 FT) ⧗



GALVESTON/CORE 25/200CM(-6.5 FT)

GALVESTON/CORE 25/200CM(-6.5 FT)

GALVESTON/CORE 25/250CM(-8.2 FT)



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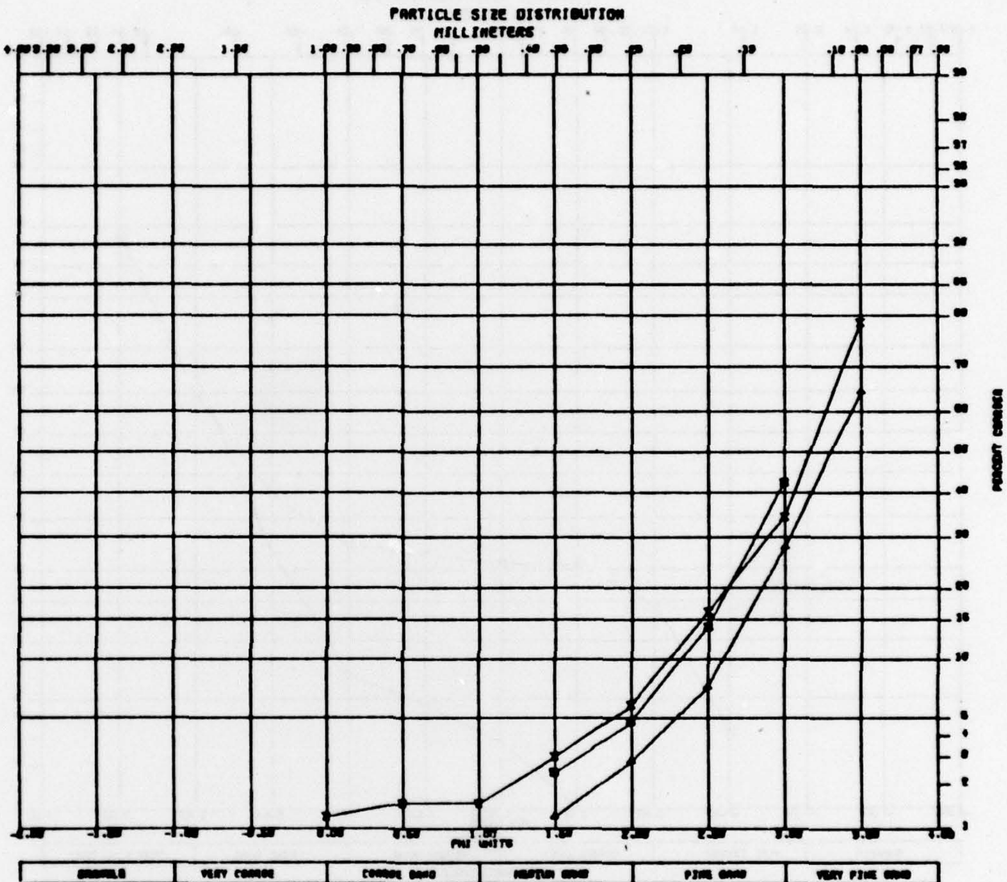
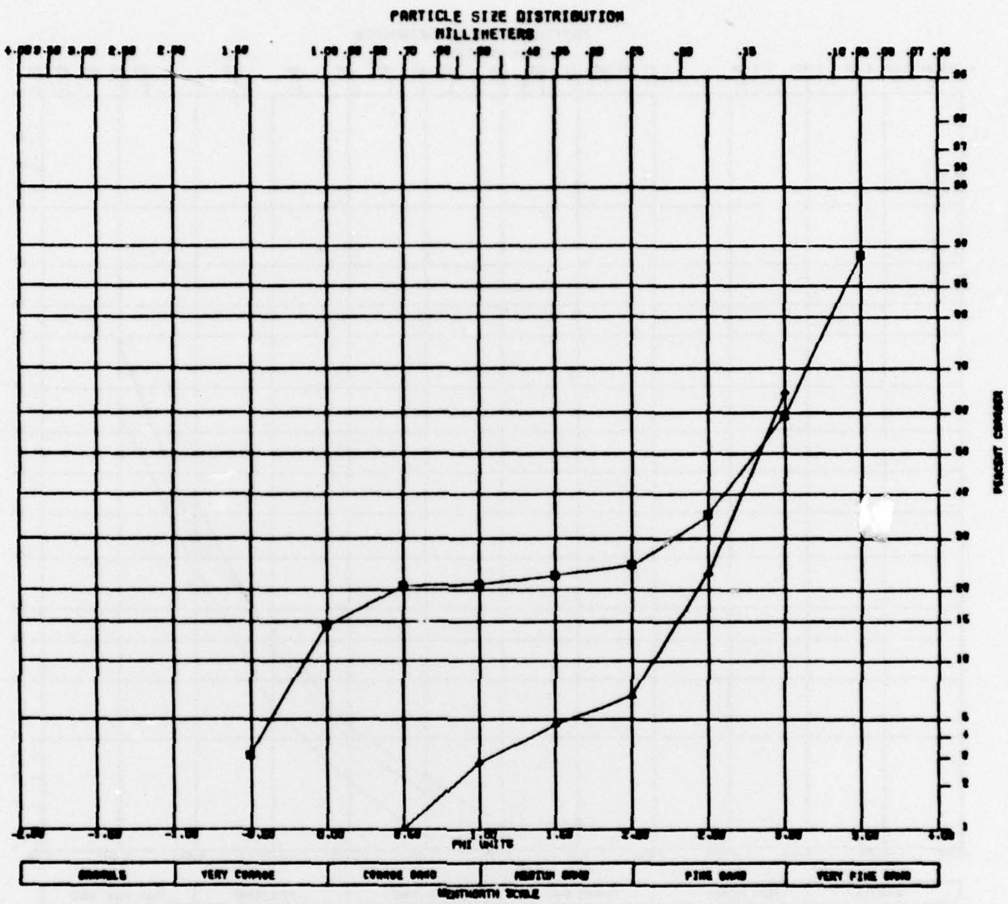
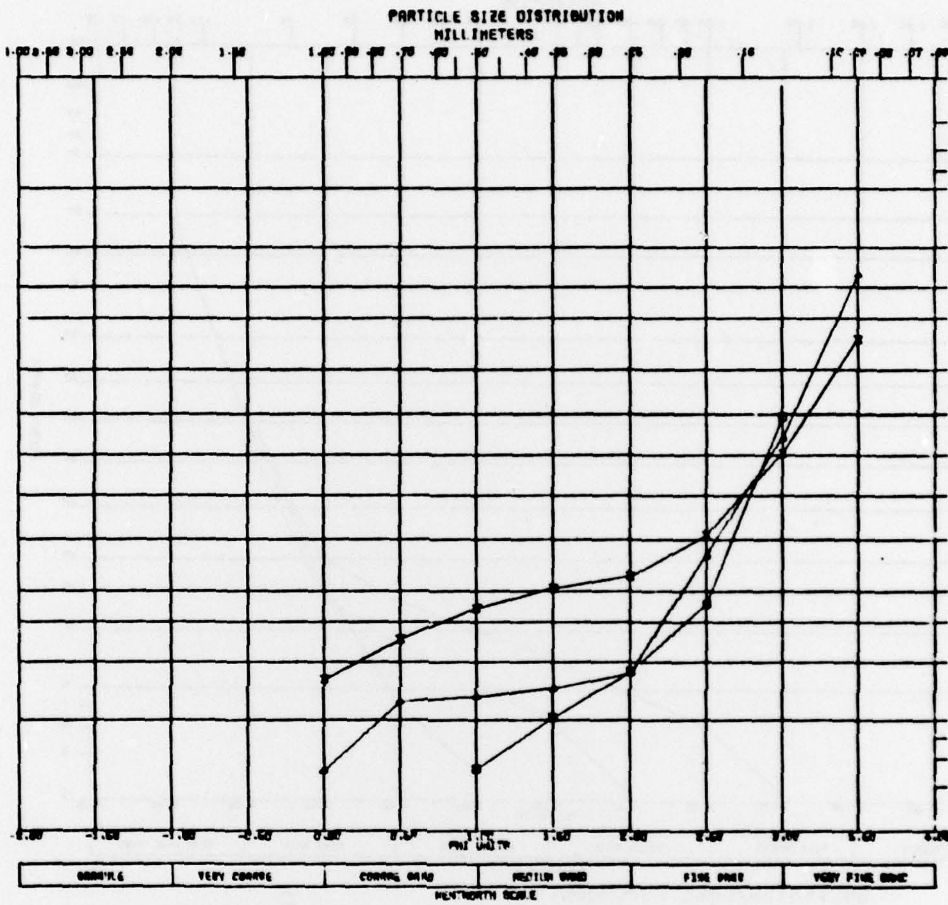
GALVESTON/CORE 25/400CM(-13.1 FT)
GALVESTON/CORE 25/405CM(-13.3 FT BTM)



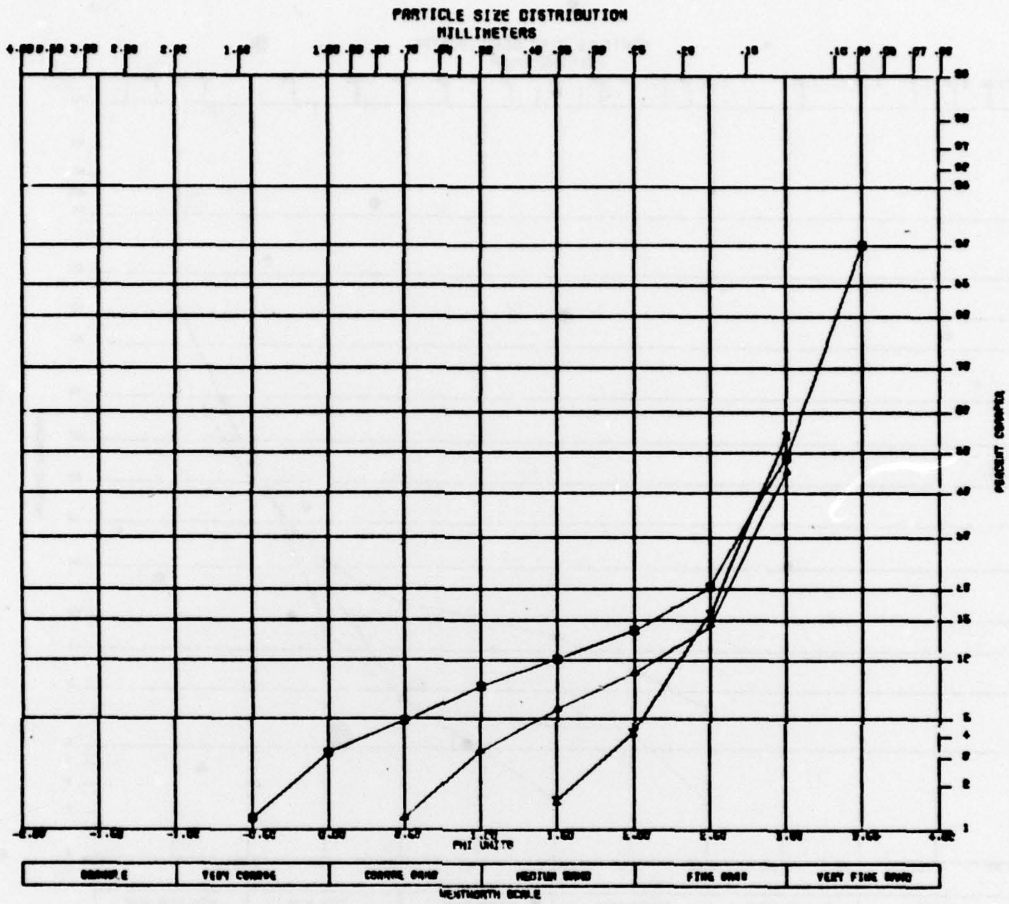
GALVESTON/CORE 25/000CM(TOP)
GALVESTON/CORE 26/080CM(-2.6 FT)
GALVESTON/CORE 26/080CM(-2.6 FT)



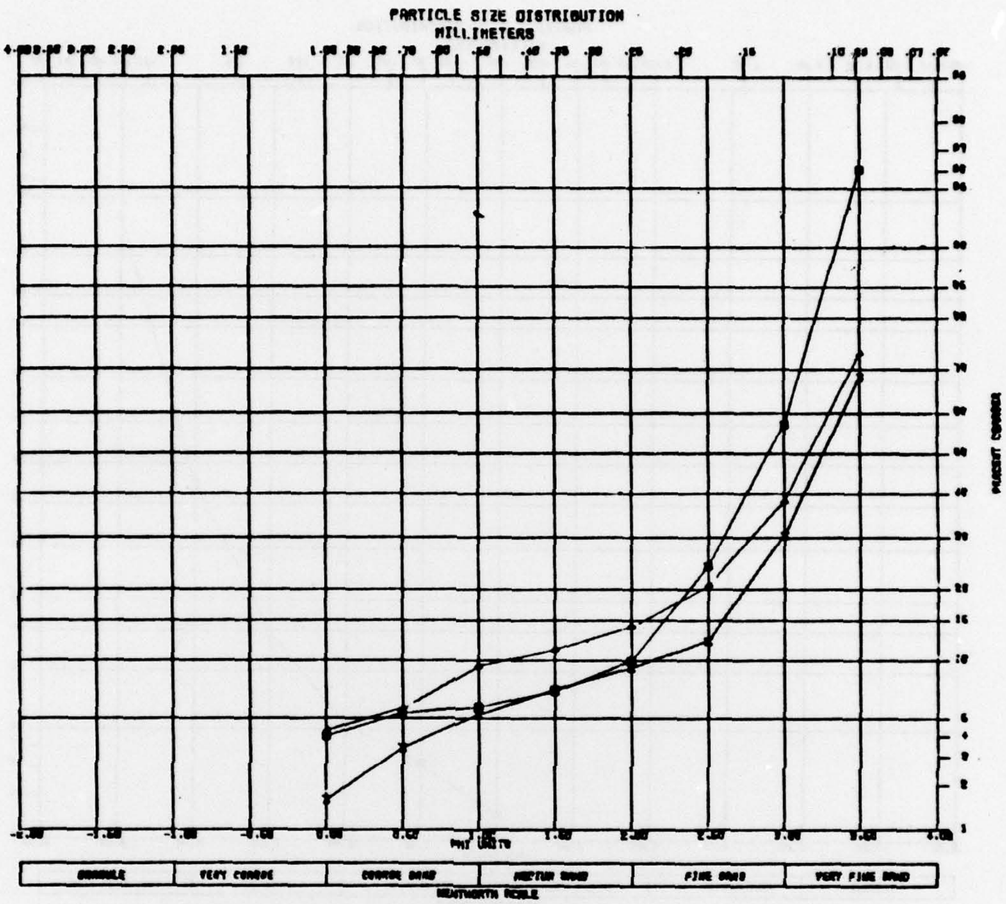
GALVESTON/CORE 24/102CM(-3.3 FT) ▢
GALVESTON/CORE 27/000CM(TOP) ▲



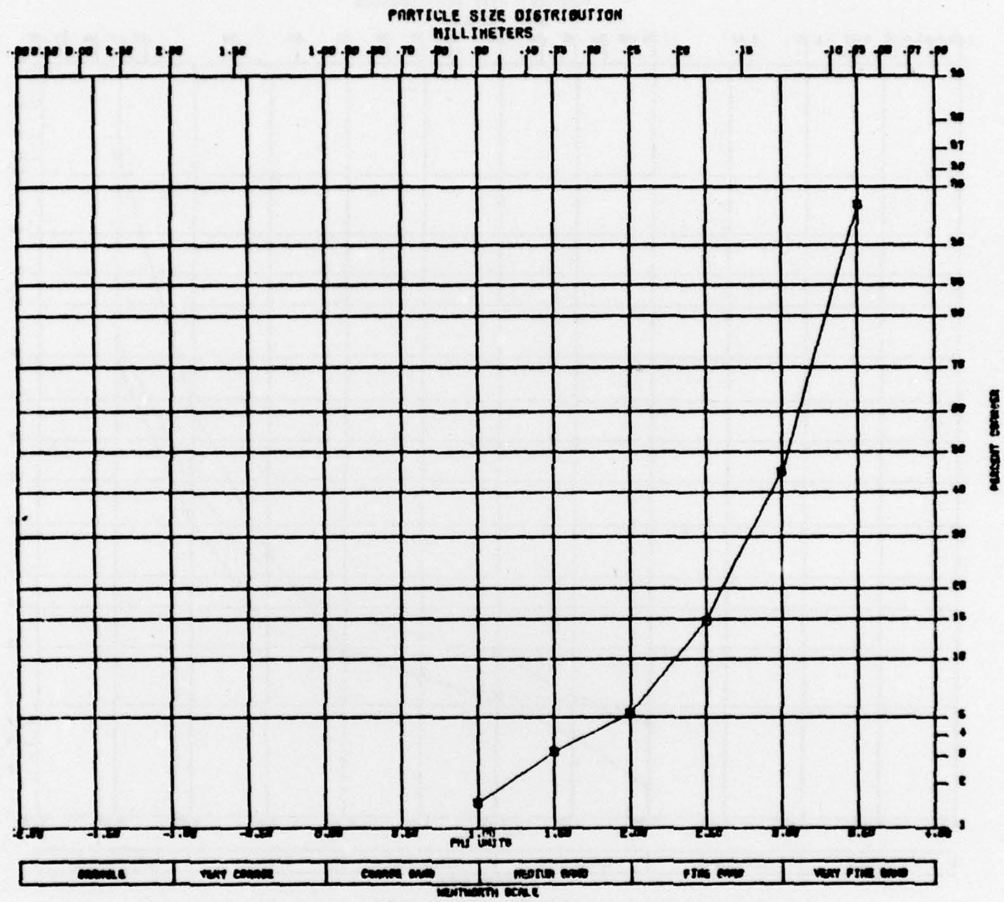
GALVESTON/CORE 27/05CCM(-1.6 FT) ▢
GALVESTON/CORE 27/100CM(-3.2 FT) △
GALVESTON/CORE 27/150CM(-4.8 FT) ⧗



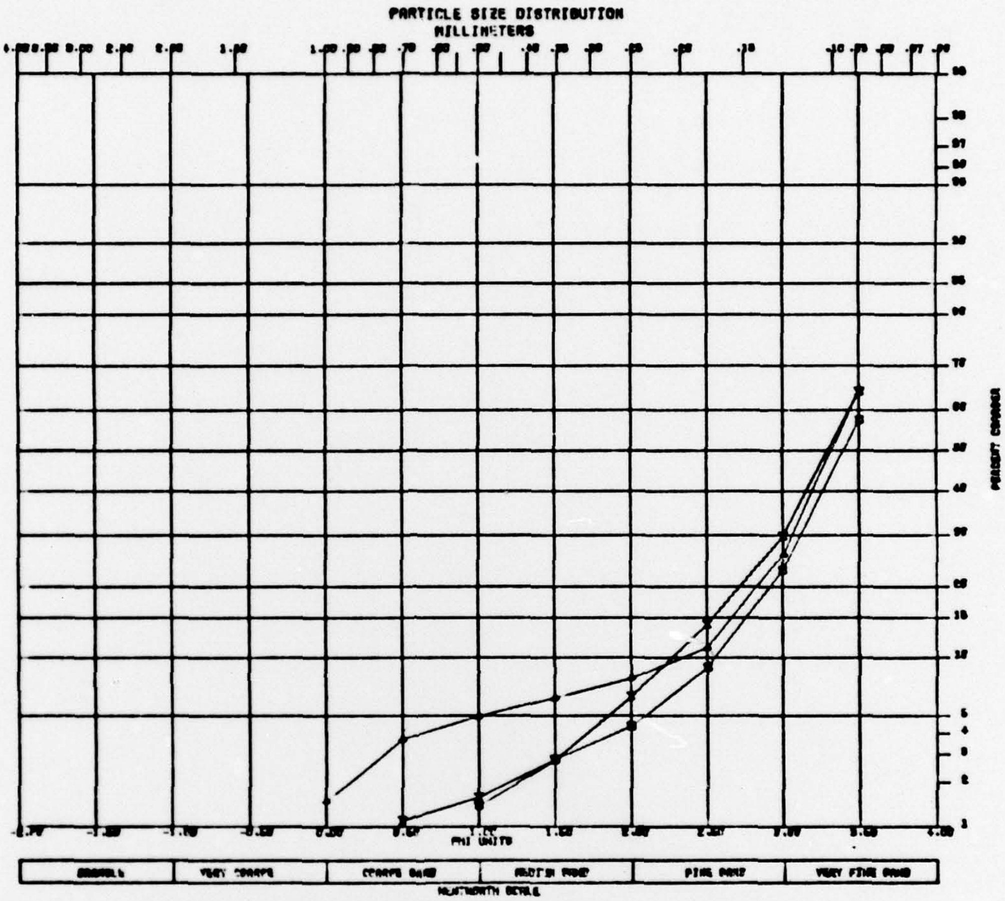
GALVESTON/CORE 28/000CM(TOP) ▢
GALVESTON/CORE 28/000CM(TOP) △
GALVESTON/CORE 28/180CM(-5.9 FT) ⧖



GALVESTON/CORE 28/353CM(-11.5 FT) □
GALVESTON/CORE 28/403CM(-13.2 FT) △
GALVESTON/CORE 34/020CM(-0.6 FT) ⧗



GALVESTON/CORE 33/200CM(-6.5 FT)



GALVESTON/CORE 34/100CM(-3.2 FT)
GALVESTON/CORE 34/200CM(-6.5 FT)
GALVESTON/CORE 34/270CM(-8.8 FT)

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TC203 .U581mr no. 79-4 627

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